



9057
RESIDENTIAL WIRING
(11B)

30S/30E/30M

An Electrical Trades Technology Course

9057: RESIDENTIAL WIRING (11B)

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Course Description

Students will be introduced to Canadian Electrical Code (CEC) standards. They will learn to design, install, test, and troubleshoot branch circuits, and become familiar with the tools, techniques, materials, and devices associated with it. Students will also be introduced to blueprint reading.

Goal 1: Describe and apply **health and safety** practices.

GLO 1.1: Describe and apply **health and safety** practices.

SLO 11B.1.1.1: Identify safety and health requirements. (A2.1)

- overview of *The Workplace Safety and Health Act* (“the Act”)
 - rights and responsibilities of employees under the *Act*
 - rights and responsibilities of employers under the *Act*
 - rights and responsibilities of supervisors under the *Act*
- fourteen (14) regulations
- codes of practice
- guidelines
- right to refuse
- Explanation of right to refuse process
 - rights and responsibilities of employees
 - rights and responsibilities of employers
 - rights and responsibilities of supervisors under the *Act*

SLO 11B.1.1.2: Describe the importance of using personal protective equipment (PPE), and identify PPE and procedures related to PPE. (A2.2) (TSA 16)

- employer and employee responsibilities as related to personal protective equipment.
- standards: Canadian Standards Association (CSA), American National Standards Institute (ANSI) and guidelines
- work protective clothing and danger if it fits poorly.
- gloves—Importance of proper glove selection (when handling chemicals, cold items, slivers, etc.)

- headwear—appropriate protective headwear when required and the approved type of headwear
- eye protection—comparison and distinction of everyday eyeglasses, industrial safety glasses and safety goggles
- foot protection—when required according to safety standards
- hearing protection
 - hazards of various noise levels (hearing protection must be worn)
 - laws
 - types of hearing protection
- respiratory protection—types, overview of proper selection
- fall protection—Manitoba requirements standards guidelines
 - ANSI (U.S.A. standards), etc.
- ladders and scaffolding
- safety principles for working with or around industrial trucks site-specific (forklifts, pallet trucks, etc.)

SLO 11B.1.1.3: Outline the safety principles for working on and around electrical equipment. (A2.3) (TSA 18)

- effects of electric current on the human body
- three factors that affect the severity of an electric shock
- the effects of arc and blast on the human body and equipment
- work with energized equipment

SLO 11B.1.1.4: Identify fire safety and outline workplace fire safety principles. (A2.4) (TSA 19)

- types of fires
- types of firefighting equipment
- classifications of fire extinguishers (A, B and C)
- location of fire extinguishers and fire exits
- fire alarms and drills

- SLO 11B.1.1.5: Recognize and control hazards. (A2.6)
- safe work practices
 - basic risk assessment
 - injury prevention and control measures
 - identification of hazards involved in pneumatic tool use and explanation of how to guard against them
- SLO 11B.1.1.6: Identify the hazards in confined spaces and the preparation needed to work in a confined space. (A2.7) (TSA 20)
- identification of a confined space
 - hazards of a confined space
 - physical
 - biological
 - working in a confined space
 - emergency response plan
 - self-contained breathing apparatus (SCBA)
- SLO 11B.1.1.7: Identify first aid/CPR. (A2.8)
- overview of first-aid regulation
 - obligations of employers regarding first aid
 - • Who is certified to provide first aid?
 - • What to do while waiting for help?
 - • Where is first-aid kit?
 - describe basic first-aid requirements and techniques
 - scope and limits of first-aid intervention
 - specific interventions (cuts, burns, abrasions, fractures, suffocation, shock, electrical shock, etc.)
 - What is it?
 - interface with other services and agencies (e.g. Workers Compensation claims)
 - Describe basic Cardiopulmonary Resuscitation (CPR) requirements and techniques
 - How do you get certified?
 - scope and limits of CPR intervention (include varieties of CPR certification)

- SLO 11B.1.1.8: Explain the Workplace Hazardous Material Information System (WHMIS), and identify the safety requirements as they apply to WHMIS. (A2.9) (TSA 13)
- WHMIS is a system
 - Provincial Regulation under The Workplace Safety and Health Act
 - Each province has a WHMIS regulation
 - Federal Hazardous Products Act
 - WHMIS generic training:
 - WHMIS defined and the format used to convey information about hazardous materials in the workplace
 - Information found on supplier and workplace labeling using WHMIS
 - Hazardous materials in accordance with WHMIS
 - Compliance with government safety standards and regulations
 - Description of WHMIS (include varieties of WHMIS Certification)
 - Typology of WHMIS labels, symbols, and classifications
 - Scope and use of Materials Safety Data Sheets (MSDS)
- SLO 11B.1.1.9: Identify and control hazards. (A2.10)
- basic control measures (injury prevention)
 - safe work procedures
 - explanation on the importance of industrial housekeeping
 - employer responsibilities
 - how and where to store materials
 - safety measures related to walkways, stairs and floor openings
 - explanation of how to protect the worker and others when working in traffic paths
- SLO 11B.1.1.10: Create and maintain a safe and organized working environment.
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GLO 1.2: Demonstrate awareness of electrical safety as it pertains to the ***Trade Safety Awareness Manual***.

No applicable SLOs.

Goal 2: Demonstrate the safe and appropriate **identification, selection, operation, maintenance, and management of equipment and tools.**

GLO 2.1: Demonstrate the safe and appropriate **identification, selection, operation, maintenance, and management of equipment and tools.**

SLO 11B.2.1.1: Demonstrate the safe and appropriate identification, selection, and operation of equipment and tools.

SLO 11B.2.1.2: Demonstrate the safe and appropriate maintenance and management of equipment and tools.

Goal 3: Demonstrate the safe and appropriate **identification, selection, installation, maintenance, and management of devices and materials.**

GLO 3.1: Demonstrate the safe and appropriate **identification, selection, installation, maintenance, and management of devices and materials.**

SLO 11B.3.1.1: Correctly identify devices and materials used in residential wiring.

SLO 11B.3.1.2: Maintain and manage devices and materials.

SLO 11B.3.1.3: Select and install residential wiring devices and materials according to the Canadian Electrical Code (CEC).

Goal 4: Demonstrate an understanding of **electrical theory (fundamentals).**

GLO 4.1: Demonstrate an understanding of **electrical theory.**

No applicable SLOs.

Goal 5: Demonstrate an understanding of the **design, layout, and interpretation of branch circuits and systems.**

GLO 5.1: Demonstrate an understanding of the **design, layout, and interpretation of branch circuits and systems.**

SLO 11B.5.1.1: Read, interpret, and communicate information from a schematic diagram used in residential wiring.

SLO 11B.5.1.2: Design and draw basic residential branch circuits and systems.

SLO 11B.5.1.3: Create a wiring diagram from a schematic.

SLO 11B.5.1.4: Select materials and devices based on the information found on the wiring diagrams.

Goal 6: Demonstrate the procedures used to **install and terminate branch circuits and systems.**

GLO 6.1: Demonstrate the procedures used to **install and terminate branch circuits and systems.**

- SLO 11B.6.1.1: Install and terminate residential branch circuits, including materials and devices.
- SLO 11B.6.1.2: Perform installation of residential wiring devices. (A6.1)
- CEC requirements
 - create connection diagrams
 - wire and terminate
 - branch circuits
 - overhead service
 - proper use and selection of tools
- SLO 11B.6.1.3: Interpret and demonstrate use of blueprints for residential applications. (A6.3)
- symbols and terminology
 - specifications

Goal 7: Demonstrate an understanding of the **testing, troubleshooting, and documentation of branch circuits and systems.**

GLO 7.1: Demonstrate an understanding of the **testing, troubleshooting, and documentation of branch circuits and systems.**

- SLO 11B.7.1.1: Test, troubleshoot, and document residential branch circuits.

Goal 8: Describe and demonstrate the transferable **cross-curricular** knowledge and skills.

GLO 8.1: **Read, interpret, and communicate** information.

No applicable SLOs.

GLO 8.2: Apply the knowledge and skills from **mathematics.**

- SLO 11B.8.2.1: Demonstrate proficiency with fractions, decimals, ratios, and percentages.
- SLO 11B.8.2.2: Demonstrate proficiency in converting from imperial to metric systems of measurement.
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GLO 8.3: Apply the knowledge and skills from the **sciences**.

No applicable SLOs.

GLO 8.4: Apply the knowledge and skills from **information and communication technology**.

SLO 11B.8.4.1: Demonstrate awareness of apps or software used in the electrical trades.

Goal 9: Understand **career opportunities and working conditions**.

GLO 9.1: Describe **apprenticeship, education, career opportunities, professional organizations, and working conditions** related to electrical trades technology and associated fields.

SLO 11B.9.1.1: Demonstrate an awareness of the apprenticeship process in the electrical trades.

SLO 11B.9.1.2: Demonstrate an awareness of the working conditions found in the various electrical trades.

Goal 10: Demonstrate awareness of **sustainability**.

GLO 10.1: Describe the impact of **human sustainability** on the health and well-being of tradespersons working in the electrical trades and those who use their services.

No applicable SLOs.

GLO 10.2: Describe the electrical trade's **sustainability practices and impact on the environment**.

SLO 11B.10.2.1: Minimize wastage of materials.

SLO 11B.10.2.2: Demonstrate an awareness of the effects of energy-saving electrical devices installed in residences.

SLO 11B.10.2.3: Practise reducing, reusing, and recycling materials.

GLO 10.3: Describe **sustainable business practices** within the electrical trades.

SLO 11B.10.3.1: Design branch circuits using a minimum of materials while meeting code requirements.

Goal 11: Demonstrate awareness of **ethical and legal standards** as they pertain to the electrical trades.

GLO 11.1: Demonstrate awareness of **ethical and legal standards**.

SLO 11B.11.1.1: Demonstrate respect for property that belongs to others (e.g., residences, tools, materials, equipment).

GLO 11.2: Demonstrate an understanding of **electrical codes**.

SLO 11B.11.2.1: Describe residential wiring methods and practices. (A5.3)

- conductors, cables and raceways
 - ampacities
 - derations
 - conditions of use
 - metallurgy (compatibility of materials)
- bonding and grounding
- perform related calculations.
 - voltage drop calculations
 - raceway fill calculations

SLO 11B.11.2.2: Describe residential wiring devices and applications. (A5.4)

- CEC requirements
- outlet boxes
 - sizes
 - types
 - applications
 - box fill calculations
- receptacles
- switches
- luminaires
- specialty outlets
- smoke detectors

SLO 11B.11.2.3: Describe residential device layout and placement. (A5.5)

- CEC requirements

SLO 11B.11.2.4: Describe residential overcurrent protection. (A5.6)

- CEC requirements
- types and their operation

SLO 11B.11.2.5: Describe residential loads and related CEC branch circuit calculations. (A5.7)

- electric range
- electric dryer
- electric hot water tank
- electric space heat and heating control requirements
- special purpose outlets
- convenience outlets (lights, receptacles)

Goal 12: Demonstrate **employability skills**.

GLO 12.1: Demonstrate **fundamental employability skills**.

- SLO 11B.12.1.1: Demonstrate regular and punctual attendance.
- SLO 11B.12.1.2: Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.
- SLO 11B.12.1.3: Demonstrate accountability by taking responsibility for their actions.
- SLO 11B.12.1.4: Demonstrate adaptability, initiative, and effort.
- SLO 11B.12.1.5: Demonstrate teamwork skills.
- SLO 11B.12.1.6: Demonstrate the ability to stay on task and effectively use time in class and work environments.
- SLO 11B.12.1.7: Demonstrate the responsible use of wireless communication devices.

GLO 12.2: Demonstrate an awareness of **cultural competence** and its importance in the workplace.

- SLO 11B.12.2.1: Demonstrate an awareness of the diversity of cultures in society.
- SLO 11B.12.2.2: Demonstrate an awareness of the importance of respecting the various cultures that would be encountered in potential worksites.

GLO 12.3: Demonstrate an understanding of the **business operation** of an electrical trades facility.

- SLO 11B.12.3.1: Participate in classroom and workstation cleanup.
- SLO 11B.12.3.2: Demonstrate an awareness of material takeoff lists.
- SLO 11B.12.3.3: Demonstrate an awareness of the need for sourcing and pricing materials.
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GLO 12.4: Demonstrate **critical thinking skills** in planning, procedures, analysis, and diagnosis.

SLO 11B.12.4.1: Demonstrate critical-thinking skills while troubleshooting branch circuits.

Goal 13: Understand the **evolution, technological progression, and emerging trends** in the electrical trades.

GLO 13.1: Understand the **evolution, technological progression, and emerging trends** in the electrical trades.

SLO 11B.13.1.1: Demonstrate an understanding of the history, technological progression, and emerging trends in residential wiring.
