



9059

ADVANCED RESIDENTIAL  
WIRING (12A)

40S/40E/40M

An Electrical Trades Technology Course



# 9059: ADVANCED RESIDENTIAL WIRING (12A) 40S/40E/40M

## Course Description

Students will build on the knowledge and skills that they learned in residential wiring, including home automation technologies, and service and demand load calculations.

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

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

SLO 12A.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 12A.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 12A.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 12A.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 12A.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 12A.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 12A.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 12A.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 12A.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 12A.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.

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**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 12A.2.1.1: Demonstrate the safe and appropriate identification, selection, and operation of equipment and tools (e.g., mega ohmmeter).

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**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 12A.3.1.1: Demonstrate the safe and appropriate identification, selection, installation, maintenance, and management of devices and materials used in service installations.

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**Goal 4:** Demonstrate an understanding of **electrical theory.**

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

SLO 12A.4.1.1: Demonstrate an understanding of home automation technologies (e.g., programmable thermostats, remote control lighting, security systems, etc.).

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**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 12A.5.1.1: Design and interpret home automation technologies (e.g., programmable thermostats, remote control lighting, security systems, etc.).

SLO 12A.5.1.2: Select components based on service calculations for single phase 3 wire, 120/240V.

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**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 12A.6.1.1: Install and terminate basic home automation technologies (e.g., programmable thermostats, remote control lighting, security systems, etc.).
- SLO 12A.6.1.2: Install and terminate residential systems.
- SLO 12A.6.1.3: Ensure the aesthetic appearance of electrical installations (e.g., using drop sheets, patching holes, etc.).
- SLO 12A.6.1.4: Describe and demonstrate various mounting methods for residential applications. (A6.4)
- fasteners and brackets
    - types
    - conditions of use
  - bolts
    - grades
    - torque specifications

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**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 12A.7.1.1: Test, troubleshoot, and document home automation technologies (e.g., programmable thermostats, remote control lighting, security systems, etc.).

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

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

- SLO 12A.8.1.1: Read, interpret, and communicate information from unfamiliar schematic diagrams.
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**GLO 8.2:** Apply the knowledge and skills from **mathematics**.

- SLO 12A.8.2.1 Calculate demand load for residential service requirements.
  - SLO 12A.8.2.2 Correctly manipulate the scales found on blueprints.
  - SLO 12A.8.2.3 Describe and demonstrate how to plot data on graphs. (A4.4)
    - display abscissa and ordinate (horizontal and vertical line)
    - display proper scaling, and base line or reference line
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**GLO 8.3:** Apply the knowledge and skills from the **sciences**.

No applicable SLOs.

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

No applicable SLOs.

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**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 12A.9.1.1: Demonstrate an awareness of the variety of working conditions (i.e., weather conditions, sanitation facilities, isolated locations, hours) found in the electrical trades, including residential, commercial, industrial, power electrician, etc.
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**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.

- SLO 12A.10.1.1: Demonstrate an awareness of the long-term health concerns associated with the electrical trades.
- SLO 12A.10.1.2: Identify ergonomics. (A2.5)
  - definition of ergonomics and conditions that may affect the body
    - working postures
    - repetition
    - force

- lifting (simple safety procedures and precautions related to material handling procedures on how to lift carry and put down a load)
  - tools
  - identify tool and safety equipment
  - causes of hand tool accidents
  - equipment
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**GLO 10.2:** Describe the electrical trade’s **sustainability practices and impact on the environment.**

SLO 12A.10.2.1: Minimize wastage of materials.

SLO 12A.10.2.2: Demonstrate an awareness of the recycling of used copper and aluminium.

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

SLO 12A.10.3.1: Demonstrate an understanding of the importance of effective price management.

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**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 12A.11.1.1: Demonstrate ethical behaviour (including respecting the property of others) while working at a workplace.

SLO 12A.11.1.2: Demonstrate the purpose of building permits and their use in the electrical trades.

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

SLO 12A.11.2.1: Demonstrate awareness of building codes that pertain to the electrical trades, but are not found in the CEC.

SLO 12A.11.2.2: Describe the installation and maintenance of power distribution and perform service calculations for single phase 3 wire (120/240V). (A5.8)

- CEC requirements
  - overcurrent protection
  - wire size and type
  - raceway size and type
  - bonding jumper size
  - grounding
  - metering
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**Goal 12: Demonstrate employability skills.****GLO 12.1: Demonstrate fundamental employability skills.**

- SLO 12A.12.1.1: Demonstrate regular and punctual attendance.
  - SLO 12A.12.1.2: Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.
  - SLO 12A.12.1.3: Demonstrate accountability by taking responsibility for their actions.
  - SLO 12A.12.1.4: Demonstrate adaptability, initiative, and effort.
  - SLO 12A.12.1.5: Demonstrate teamwork skills.
  - SLO 12A.12.1.6: Demonstrate the ability to stay on task and effectively use time in class and work environments.
  - SLO 12A.12.1.7: Demonstrate the responsible use of wireless communication devices.
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**GLO 12.2: Demonstrate an awareness of cultural competence and its importance in the workplace.**

- SLO 12A.12.2.1: Demonstrate an awareness of the need to interact positively with people of different cultures in society and in the workplace.
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**GLO 12.3: Demonstrate an understanding of the business operation of an electrical trades facility.**

- SLO 12A.12.3.1: Participate in classroom and workstation cleanup.
  - SLO 12A.12.3.2: Develop material take off lists from information on blueprint or site assessment.
  - SLO 12A.12.3.3: Source and price materials.
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**GLO 12.4: Demonstrate critical thinking skills in planning, procedures, analysis, and diagnosis.**

- SLO 12A.12.4.1: Demonstrate critical-thinking skills.
  - SLO 12A.12.4.2: Use a variety of strategies in order to diagnose and solve problems.
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**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 12A.13.1.1: Demonstrate an awareness of the evolution, technological progression, and emerging trends in residential wiring.

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