



9062

APPLIED ELECTRICAL
TRADES TECHNOLOGY (12D)

40S/40E/40M

An Electrical Trades Technology Course

9062: APPLIED ELECTRICAL TRADES TECHNOLOGY (12D) 40S/40E/40M

Course Description

Students will synthesize and apply knowledge and skills acquired in all previous courses to design, install, troubleshoot, and document electrical circuits with a minimum of supervision and direction. Students will also focus on skills and activities to ease in the transition to employment or post-secondary education.

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

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

SLO 12D.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 12D.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 12D.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 12D.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 12D.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 12D.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 12D.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 12D.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 12D.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 12D.1.1.10: Create and maintain a safe and organized working environment.
-

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 12D.2.1.1: Demonstrate the safe and appropriate identification, selection, and operation of equipment and tools associated with motor controls.
- SLO 12D.2.1.2: Demonstrate the safe and appropriate identification, selection, and operation of equipment and tools associated with various types of raceways.
- SLO 12D.2.1.3: Demonstrate the safe and appropriate identification, selection, and operation of equipment and tools associated with retrofitting or upgrading existing electrical installations.

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 12D.3.1.1: Demonstrate the safe and appropriate identification, selection, installation, maintenance, and management of motor controls.
 - SLO 12D.3.1.2: Demonstrate the safe and appropriate identification, selection, installation, maintenance, and management of raceways-associated boxes and devices.
 - SLO 12D.3.1.3: Demonstrate the safe and appropriate identification, selection, installation, maintenance, and management of retrofitting or upgrading existing electrical installations.
-

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

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

SLO 12D.4.1.1: Synthesize theoretical knowledge required to design, lay out, and interpret electrical branch circuits and systems.

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 12D.5.1.1: Synthesize knowledge and skills required to design, lay out, and interpret branch circuits and systems with minimal supervision and direction.

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 12D.6.1.1: Synthesize knowledge and skills required to install and terminate branch circuits and systems with minimal supervision and direction.

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 12C.7.1.1: Synthesize knowledge and skills required to design, lay out, and interpret branch circuits and systems with minimal supervision and direction.

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

GLO 8.1: Read, interpret, and communicate information.

SLO 12D.8.1.1: Demonstrate the ability to navigate unfamiliar portions of the Canadian Electrical Code (CEC) in order to find applicable and relevant information and regulations.

SLO 12D.8.1.2: Describe the communication skills/modes used in the workplace. (A3.1)

- verbal communications
 - face-to-face contact
 - telephone
 - group environment
- written communications
 - letters and memos
 - fax
 - email

SLO 12D.8.1.3: Describe the importance of the customer. (A3.2)

- costs and benefits of retaining a customer
- costs and benefits of gaining new customers
- value of repeat business
- techniques for recovering 'lost' customers

SLO 12D.8.1.4: Describe effective techniques for addressing customer complaints. (A3.3)

- written complaints
- difficult situations with customers
 - angry customers
 - impatient customers
 - indecisive customers
 - other situations

SLO 12D.8.1.5: Describe techniques for maintaining good communication in the workplace. (A3.4)

- internal communications
 - support staff
 - fellow staff (colleagues)
 - supervisors
 - management
- external communications
 - tradespersons
 - retail customers
 - wholesale customers
 - suppliers
 - authorities (inspectors, general contractors)

SLO 12D.8.1.6: Describe general organization and basic reading strategies for trade-related documents. (A3.5)

- service bulletins
 - tech bulletins
 - service manuals
 - other publications
 - computer-based resources
 - online resources
-

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

SLO 12D.8.2.1: Demonstrate the mathematical skills required to install and terminate branch circuits and systems.

GLO 8.3: Apply the knowledge and skills from the **sciences**.

SLO 12D.8.3.1: Demonstrate the knowledge and skills from science required to install and terminate branch circuits and systems.

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

SLO 12D.8.4.1: Create trade-related documents using proper writing techniques. (A3.6)

- prepare a business email
- define technical terms using expansion techniques
- write instructions to inform readers
- project planning

SLO 12D.8.4.2: Demonstrate trade-related computer skills, as specified by the instructor. (A3.7)

- office application programs
 - word processor (e.g. Microsoft Word)
 - spreadsheet (e.g. Microsoft Excel)
 - presentation software (e.g. Microsoft PowerPoint)
 - learning Management Systems (LMSs) in a computer environment
 - Internet searching skills for trade-related research
 - search engines via Universal Resource Locator (URL) addresses
 - key word search
 - filtering results
 - using email for work related communications
 - public email service
 - email addresses
 - sending and replying to email
 - adding attachments to email (text, documents, graphs)
 - email website links
-

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 12D.9.1.1: Describe the structure and scope of the construction electrician, industrial electrician, and power electrician trades. (A1.1)

- *The Apprenticeship and Certification Act*
 - Apprenticeship and Certification Board and Provincial Advisory Committees
 - general and specific trade regulation
 - policies regarding attendance, evaluation procedures, conduct and progression requirements (Apprenticeship Manitoba, Training provider)
- uses of the Red Seal Occupational Standard (RSOS) for Construction Electrician and Industrial Electrician or the Provincial Occupational Standard (POS) for Power Electrician
 - technical training in-school curriculum
 - on-the-job record book of hours (Manitoba blue book)
 - logbook of on-the-job task competencies
 - examinations (level placement tests, final certification examinations)
- opportunities and future career options
 - generalists and specialists (The move toward specialization is well known to modern tradespeople. Some prefer to specialize and others want to do it all. Supervisory positions require a broad scope.)
 - lead hands and other immediate supervisors (Apprentices need to know how to become a lead-hand as much as they need to know the benefits and pit-falls of leadership between management and shop floor workers.)
 - geographic mobility (What does it mean to a construction/industrial worker to have to travel to find work? Are there more opportunities if they do? What are they? What are the draw-backs to being away from home for several weeks at a time?)

- job hierarchies and innovations (What trade specific special training opportunities are available in your trade? Is there travel involved? Is there an opportunity to move up the ladder on a work crew as opposed to staying in the shop?)

SLO 12D.9.1.2: Describe two levels of workplace competency. (A1.2)

- job competencies related to workplace culture
 - knowledge of workplace equipment and materials
 - skills and techniques
- social competencies related to workplace culture
 - frame of reference for evaluation workplace events
 - language of work
 - workplace belief systems
 - rules and meanings
 - multiculturalism and equity in the workplace

SLO 12D.9.1.3: Describe accommodation for apprentices with disabilities. (A1.3)

- technical training
 - requirements
 - 1 Roles and responsibilities
 - 2 Services and information required by persons with disabilities
- on-the-job
 - requirements
 - 3 Roles and responsibilities
 - 4 Services and information required by persons with disabilities

SLO 12D.9.1.4: Create a portfolio for obtaining employment.

SLO 12D.9.1.5: Research potential employers in the electrical trades and associated fields.

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 12D.10.2.1: Minimize wastage of materials.

SLO 12D.10.2.2: Design circuits and systems that maximize the efficient use of materials.

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

SLO 12D.10.3.1: Demonstrate an understanding of the importance of remaining up to date with current technologies.

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.**

No applicable SLOs.

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

No applicable SLOs.

Goal 12: Demonstrate **employability skills.**

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

SLO 12D.12.1.1: Demonstrate regular and punctual attendance.

SLO 12D.12.1.2: Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.

SLO 12D.12.1.3: Demonstrate accountability by taking responsibility for their actions.

SLO 12D.12.1.4: Demonstrate adaptability, initiative, and effort.

SLO 12D.12.1.5: Demonstrate teamwork skills.

SLO 12D.12.1.6: Demonstrate the ability to stay on task and effectively use time in class and work environments.

SLO 12D.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 12D.12.2.1: Demonstrate respect for cultural differences.

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

SLO 12D.12.3.1: Estimate time required to complete assigned task.

GLO 12.4: Demonstrate **critical thinking skills** in planning, procedures, analysis, and diagnosis.

SLO 12D.12.4.1: Demonstrate critical-thinking skills required to install and terminate branch circuits and systems with a minimum of supervision and direction.

SLO 12D.12.4.2: Demonstrate critical-thinking skills required to analyze and diagnose problems with a minimum of supervision and direction.

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 12D.13.1.1: Demonstrate an awareness of the evolution, technological progression, and emerging trends in electrical power generation.
