



**8991 ELECTRICAL
FUNDAMENTALS (9)**

30S / 30E / 30M

**A Refrigeration and Air Conditioning Technology
Course**

8991 ELECTRICAL FUNDAMENTALS (12D)

30S / 30E / 30M

Course Description

A student wanting to develop skills in the refrigeration and air conditioning industry must have knowledge of basic electrical systems. The student will develop skills in using basic calculations, tools, and meters to test electrical circuits. The student will also be able do basic assembly of electrical components and wiring.

Goal 1: Describe and apply appropriate **health and safety** practices as they apply to refrigeration and air conditioning.

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

- SLO 11C.1.1.1 Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS) as they apply to the refrigeration and air conditioning service and repair industry. (A3.11)
- SLO 11C.1.1.2 Describe the purpose of Material Safety Data Sheets (MSDS).
- SLO 11C.1.1.3 Describe workplace health and safety procedures (e.g., S.A.F.E., right to refuse). (A3.11)
- SLO 11C.1.1.4 Demonstrate the ability to follow safety information on supplier labels.
- SLO 11C.1.1.5 Identify the process for reporting injuries.
- SLO 11C.1.1.6 Identify ergonomically correct procedures to avoid injury (e.g., stress, strain). (A3.7)
- SLO 11C.1.1.7 Identify fire prevention and control strategies.
- SLO 11C.1.1.8 Identify emergency evacuation and response procedures.
- SLO 11C.1.1.9 Identify hazards and describe safe work practices pertaining to air compressors.

GLO 1.2: Create and maintain a **safe working environment**.

- SLO 11C.1.2.1 Identify hazards and precautions working with and around energized equipment. (A12.2)
- SLO 11C.1.2.2 Identify and report hazards (e.g., electrical safety, ergonomics, material handling, and chemical) related to

	processes, materials, tools, and equipment used in the refrigeration and air conditioning facility.
SLO 11C.1.2.3	Follow the directions of the teacher/supervisor with regard to safe work practices.
SLO 11C.1.2.4	Follow safe practices and procedures for facilities, processes, materials, tools, and equipment used in the refrigeration and air conditioning shop (e.g., keep work area clean and organized, avoid distractions).
SLO 11C.1.2.5	Describe and use appropriate personal protective equipment (e.g., gloves, safety glasses or goggles, hearing protection, respirator mask, etc.). (A3.2)
SLO 11C.1.2.6	Locate first aid and eyewash station.
SLO 11C.1.2.7	Identify and report hazards (e.g., electrical, ergonomic, material handling, chemicals, and spills) related to materials, processes, tools, and equipment used in the refrigeration and air conditioning facility.

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

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

SLO 11C.2.1.1	Identify types of electrical tools, and describe their application and procedures for use.
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Goal 3: Demonstrate the safe and appropriate **use of materials**.

GLO 3.1: Demonstrate the safe and appropriate use of **fasteners and supports**.

SLO 11C.3.1.1	Demonstrate the safe and appropriate selection and application of fasteners and supports used in electrical fundamentals.
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GLO 3.2: Demonstrate the safe and proper manipulation of **pipng and tubing**.

No applicable SLOs.

GLO 3.3: Demonstrate the safe and proper manipulation of sheet metal.

No applicable SLOs.

GLO 3.4: Demonstrate the appropriate management of materials.

SLO 11C.3.4.1 Demonstrate the safe and appropriate management of electrical materials used in the refrigeration and air conditioning trade.

Goal 4: Install heating, cooling, and refrigeration equipment.

GLO 4.1: Demonstrate an awareness of the **installation requirements for** heating, cooling, and refrigeration equipment.

SLO 11C.4.1.1 Identify procedures for, awareness of, and codes related to electrical installations.

GLO 4.2: Demonstrate the appropriate **installation** of heating, cooling, and refrigeration equipment.

SLO 11C.4.2.1 Demonstrate appropriate installation of electrical equipment related to HVAC/R systems.

GLO 4.3: Test and document refrigeration and air conditioning systems.

SLO 11C.4.3.1 Test electrical systems.

Goal 5: Repair heating, cooling, and refrigeration equipment.

GLO 5.1: Diagnose problems in heating, cooling, and refrigeration equipment.

SLO 11C.5.1.1 Diagnose electrical problems in heating, cooling, and refrigeration equipment.

GLO 5.2: Repair heating, cooling, and refrigeration equipment.

SLO 11C.5.2.1 Perform repairs on electrical systems.

Goal 6: Service heating, cooling, and refrigeration equipment.

GLO 6.1: Demonstrate awareness of the **servicing needs** of heating, cooling, and refrigeration equipment.

SLO 11C.6.1.1 Identify service and maintenance required for electrical components.

SLO 11C.6.1.2 Perform service on electrical components.

Goal 7: Describe and demonstrate the transferable **cross-curricular** knowledge and skills as they pertain to the refrigeration and air conditioning service and repair industry.

GLO 7.1: Demonstrate skills from **information and communication technology**.

SLO 11C.7.1.1 Demonstrate awareness of the computerized systems found in refrigeration and air conditioning equipment.

GLO 7.2: Read, interpret, and communicate information relevant to the refrigeration and air conditioning service and repair industry.

SLO 11C.7.2.1 Read, interpret, and communicate electrical diagrams.

SLO 11C.7.2.2 Read, interpret, and communicate electrical information found on nameplates.

GLO 7.3: Apply the knowledge and skills related to the refrigeration and air conditioning service and repair industry from **mathematics**.

SLO 11C.7.3.1 Apply mathematical formulas to electrical calculations.

GLO 7.4: Apply the knowledge and skills related to the refrigeration and air conditioning service and repair industry from the sciences.

SLO 11C.7.4.1 Identify units of electrical measurement and symbols. (A12.3)

SLO 11C.7.4.2 Identify types of conductors, and describe their characteristics and applications. (A12.5)

SLO 11C.7.4.3 Identify the factors used to determine conductor ampacity rating. (A12.6)

SLO 11C.7.4.4 Identify types of wire insulating materials, and describe their characteristics and applications. (A12.7)

SLO 11C.7.4.5 Describe an overloaded, grounded, open, and short circuit. (A12.12)

SLO 11C.7.4.6 Identify types of electrical wiring diagrams, and describe their purpose. (A12.19)

Goal 8: Demonstrate awareness of **sustainability** as it pertains to the refrigeration and air conditioning service and repair industry.

GLO 8.1: Describe the impact of **human sustainability** on the health and well-being of refrigeration and air conditioning mechanics and society.

SLO 11C.8.1.1 Discuss the long-term health hazards related to electrical systems.

GLO 8.2: Describe the refrigeration and air conditioning industry's sustainability practices and impact on the **environment**.

SLO 11C.8.2.1 Demonstrate the salvaging of scrap copper wire and components.

GLO 8.3: Describe **sustainable business practices** within the refrigeration and air conditioning service and repair industry.

SLO 11C.8.3.1 Discuss how modern electronic equipment requires more highly qualified technicians to diagnose, repair, and maintain.

Goal 9: Demonstrate awareness of the ethical and legal standards as they pertain to the refrigeration and air conditioning service and repair industry.

GLO 9.1: Practise the **ethical and legal standards** as they pertain to the refrigeration and air conditioning service and repair industry.

SLO 11C.9.1.1 Discuss the importance of ethics in relation to the servicing of HVAC/R systems.

Goal 10: Demonstrate **employability skills** related to the refrigeration and air conditioning service and repair industry.

GLO 10.1: Demonstrate **fundamental employability skills**.

SLO 11C.10.1.1 Demonstrate critical-thinking and problem-solving skills.

SLO 11C.10.1.2 Demonstrate regular attendance and punctuality.

SLO 11C.10.1.3 Demonstrate accountability by taking responsibility for their actions.

SLO 11C.10.1.4 Demonstrate adaptability, initiative, and effort.

SLO 11C.10.1.5 Demonstrate the ability to accept and follow direction and feedback.

- SLO 11C.10.1.6 Demonstrate teamwork skills.
- SLO 11C.10.1.7 Stay on task and use time effectively.
- SLO 11C.10.1.8 Communicate respectfully and effectively with coworkers and customers.

GLO 10.2: Demonstrate an understanding of the business operation of a refrigeration and air conditioning service and repair facility.

- SLO 11C.10.2.1 Discuss the effect of wasting materials on the business operation of a refrigeration and air conditioning facility.

Goal 11: Understand **career opportunities** in the refrigeration and air conditioning service and repair industry and associated professions.

GLO 11.1: Describe **education** and **career opportunities** and **professional organizations** in the refrigeration and air conditioning service and repair industry and associated professions.

- SLO 11C.11.1.1 Demonstrate an awareness of education and career opportunities and professional organizations in the electrical industry.

Goal 12: Understand the **evolution, technological progression,** and **emerging trends** in the refrigeration and air conditioning service and repair industry.

GLO 12.1: Describe the **evolution, technological progression,** and **emerging trends** in the refrigeration and air conditioning service and repair industry.

- SLO 11C.12.1.1 Discuss progression of electrical controls and equipment used in the HVAC industry..

