8987
Introduction to Refrigeration and Air Conditioning (9)

20S / 20E / 20M

A Refrigeration and Air Conditioning Technology Course

8987 Introduction to Refrigeration and Air Conditioning (12D) 20S / 20E / 20M

Course Description

A student wanting to develop skills in the refrigeration and air conditioning service and repair industry must have knowledge of the basic principles related to refrigeration and air conditioning equipment systems and service. Students learn safety, tools and equipment, refrigeration and air conditioning equipment systems, air movement systems, and ductwork fabrication.

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 10.1.1.1	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 10.1.1.2	Describe the purpose of Material Safety Data Sheets (MSDS).
SLO 10.1.1.3	Describe workplace health and safety procedures (e.g., S.A.F.E., right to refuse). (A3.11)
SLO 10.1.1.4	Demonstrate the ability to follow safety information on supplier labels.
SLO 10.1.1.5	Identify the process for reporting injuries.
SLO 10.1.1.6	Identify ergonomically correct procedures to avoid injury (e.g., stress, strain). (A3.7)
SLO 10.1.1.7	Identify fire prevention and control strategies.
SLO 10.1.1.8	Identify emergency evacuation and response procedures.

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

SLO 10.1.2.1	Identify hazards and precautions working with and around energized equipment. (A12.2)
SLO 10.1.2.2	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 10.1.2.3	Follow the directions of the teacher/supervisor with regard to safe work practices.
SLO 10.1.2.4	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 10.1.2.5	Describe and use appropriate personal protective equipment (e.g., gloves, safety glasses or goggles, hearing protection, respirator mask, etc.). (A3.2)
SLO 10.1.2.6	Locate first aid and eyewash station.
SLO 10.1.2.7	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 10.2.1.1	Identify types of hand tools, and describe their applications and procedures for use. (A4.1)
SLO 10.2.1.2	Demonstrate the use of hand, power, and specialized tools and equipment. (A4.13)
SLO 10.2.1.3	Identify types of flaring and swaging tools, and describe their applications and procedures for use and maintenance. (A9.6)
SLO 10.2.1.4	Define terminology associated with sheet metal tools and equipment.
SLO 10.2.1.5	Demonstrate the proper use of tools and equipment to cut, bend, manufacture, and join sheet metal components.
SLO 10.2.1.6	Describe the procedures used to store and maintain hand tools. (A4.2)
SLO 10.2.1.7	Describe the procedures used to store and maintain portable and stationary power tools. (A4.4)

Goal 3: Demonstrate the safe and appropriate **use of materials.**

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

SLO 10.3.1.1 Demonstrate the safe and appropriate selection and application of fasteners and supports.

GLO 3.2: Demonstrate the safe and proper manipulation of **piping and tubing**.

SLO 10.3.2.1 Define terminology associated with piping, flaring, tubing, soldering, and brazing. (A9.1)

SLO 10.3.2.2 Describe the process for cutting pipe and tubing to proper sizes. (A9.5)

SLO 10.3.2.3 Demonstrate flaring, soldering, and brazing. (A9.18)

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

SLO 10.3.3.1 Demonstrate the safe and proper manipulation of sheet metal materials.

SLO 10.3.3.2 Describe the process for measuring, cutting, bending, and joining sheet metal components and for the use of related tools.

SLO 10.3.3.3 Fabricate ductwork fittings according to directions.

GLO 3.4: Demonstrate the appropriate management of materials.

SLO 10.3.4.1 Demonstrate the safe and appropriate management of 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.

No applicable SLOs.

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

SLO 10.4.2.1 Discuss appropriate installation techniques and requirements.

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

SLO 10.4.3.1 Demonstrate awareness of the importance of testing and documenting refrigeration and air conditioning systems.

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

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

SLO 10.5.1.1 Demonstrate an awareness of problems in heating, cooling, and refrigeration equipment.

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

No applicable SLOs.

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

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

No applicable SLOs.

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.**

No applicable SLOs.

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

No applicable SLOs.

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

SLO 10.7.3.1 Demonstrate the use of fractions, decimals, ratios, and percentages.

SLO 10.7.3.2 Apply mathematical formulas and processes.

SLO 10.7.3.3 Convert between imperial, standard, and metric systems of measurement.

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

SLO 10.7.4.1	Apply scientific knowledge and equations to electrical OHMs laws formulas.
SLO 10.7.4.2	Define terminology associated with electrical fundamentals. (A12.1)
SLO 10.7.4.3	Describe current and electron flow in both direct and alternating current circuits.
SLO 10.7.4.4	Describe the relationship between voltages, current, resistance, and power. (A12.8)
SLO 10.7.4.5	Calculate voltage, current, and resistance in series, parallel, and combination circuits. (A12.9)
SLO 10.7.4.6	Identify series, parallel, and series/parallel electrical circuits, and describe their characteristics. (A12.11)
SLO 10.7.4.7	Demonstrate measuring voltage, resistance, current, and power. (A12.20)

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 10.8.1.1	Demonstrate an understanding of human sustainability.
SLO 10.8.1.2	Demonstrate an awareness of ergonomics.

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

SLO 10.8.2.1	Demonstrate knowledge of efficient material usage to reduce waste and its impact on the environment.
SLO 10.8.2.2	Identify recycling processes for materials.

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

SLO 10.8.3.1	Discuss business practices and the differences between those that are sustainable and those that are not.

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 10.9.1.1	Identify ethical and legal standards.
SLO 10.9.1.2	Discuss the need for building codes.

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

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

SLO 10.10.1.1	Demonstrate critical-thinking and problem-solving skills.
SLO 10.10.1.2	Demonstrate regular attendance and punctuality.
SLO 10.10.1.3	Demonstrate accountability by taking responsibility for their actions.
SLO 10.10.1.4	Demonstrate adaptability, initiative, and effort.
SLO 10.10.1.5	Demonstrate the ability to accept and follow direction and feedback.
SLO 10.10.1.6	Demonstrate teamwork skills.
SLO 10.10.1.7	Stay on task and use time effectively.
SLO 10.10.1.8	Communicate respectively 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 10.10.2.1	Identify some factors that are required for 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 10.11.1.1 Identify career paths related to the HVAC industry and associated occupations.

SLO 10.11.1.2 Identify employment and educational opportunities related to HVAC/R and associated occupations.

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 10.12.1.1 Discuss the evolution, technical progression, and emerging trends in the HVAC industry.