



**8995 REFRIGERATION AND
AIR COOLING SYSTEMS (9)**

40S / 40E / 40M

A Refrigeration and Air Conditioning Technology
Course

8995

REFRIGERATION AND AIR COOLING SYSTEMS (12D) 40S / 40E / 40M

Course Description

A student wanting to develop skills in the refrigeration and air conditioning industry must have knowledge of the concepts of cooling air and the effects cooling air has on the products in storage and on air properties. The student will be able to identify various system components, how they are assembled, and their relationship to one another.

Goal 1: Describe and apply appropriate **health and safety practices** as they relate to the **maintenance of a safe workspace**.

GLO 1.1: Create and maintain a **safe working environment** in machining technology.

- SLO 12B.1.1.1 Demonstrate awareness of the principles of workplace hazards surrounding refrigeration and air cooling environments.
- SLO 12B.1.1.2 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 12B.1.1.3 Describe the purpose of Material Safety Data Sheets (MSDS).
- SLO 12B.1.1.4 Describe workplace health and safety procedures (e.g., S.A.F.E., right to refuse). (A3.11)
- SLO 12B.1.1.5 Follow safety information on supplier labels.
- SLO 12B.1.1.6 Identify the process for reporting injuries.
- SLO 12B.1.1.7 Identify ergonomically correct procedures to avoid injury (e.g., stress, strain). (A3.7)
- SLO 12B.1.1.8 Identify fire prevention and control strategies.
- SLO 12B.1.1.9 Identify emergency evacuation and response procedures.

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

- SLO 12B.1.2.1 Identify hazards and precautions working with and around pressurized equipment.
- SLO 12B.1.2.2 Identify hazards and precautions working with and around energized equipment. (A12.2)

- SLO 12B.1.2.3 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 shop.
- SLO 12B.1.2.4 Follow the directions of the teacher/supervisor in regards to safe work practices.
- SLO 12B.1.2.5 Follow safe practices and procedures for facilities, processes, materials, tools, and equipment used in the refrigeration and air conditioning shop (e.g., equipment used in the refrigeration and air conditioning shop (e.g., keep work area clean and organized, avoid horseplay). keep work area clean and organized, avoid horseplay).
- SLO 12B.1.2.6 Describe and use appropriate personal protective equipment. (e.g., gloves, safety glasses or goggles, hearing protection, respirator mask, etc.). (A3.2)
- SLO 12B.1.2.7 Locate first aid and eyewash station.
- SLO 12B.1.2.8 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 12B.2.1.1 Demonstrate the safe and appropriate selection, operation, and management of equipment and tools used in refrigeration and air cooling systems.

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

GLO 3.1 Demonstrate the safe and proper appropriate selection and utilization of **fasteners and supports.**

- SLO 12B.3.1.1 Identify and describe proper selection and application of fasteners and supports.

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

- SLO 12B.3.2.1 Describe and demonstrate the proper selection, set-up, modification, and manipulation of related piping and tubing systems.

GLO 3.3 Demonstrate the safe and appropriate manipulation of **sheet metal**.

No applicable SLO.

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 12B.4.1.1 Identify proper system components and types for various installation applications.

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

SLO 12B.4.2.1 Demonstrate appropriate installation of refrigeration and air cooling systems.

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

SLO 12B.4.3.1 Test HVAC/R systems, and record temperatures and pressure measurements.

Goal 5: Diagnose and repair heating, cooling, and refrigeration equipment.

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

SLO 12B.5.1.1 Diagnose problems in HVAC/R equipment.

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

SLO 12B.5.2.1 Perform necessary and assigned repairs to refrigeration and air cooling 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 12B.6.1.1 Identify service and maintenance required for refrigeration and air cooling systems.

GLO 6.2: Demonstrate the appropriate **servicing** of heating, cooling, and refrigeration equipment.

SLO 12B.6.2.1 Perform service and testing on refrigeration and air cooling systems.

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 SLO.

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

SLO 12B.7.2.1 Apply use of manuals to refrigeration and air cooling systems.

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

No applicable SLO.

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

SLO 12B.7.4.1 Apply necessary mathematical formulas to perform air movement calculations.

SLO 12B.7.4.2 Perform superheating and sub-cooling calculations.

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 their clients.

SLO 12A.8.1.1 Discuss the long-term health and human sustainability concerns for refrigeration and air conditioning technicians.

SLO 12B.8.1.2 Discuss the contribution of refrigeration and air cooling systems to human health and well-being.

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

SLO 12B.8.2.1 Discuss the need to recover refrigerants to prevent their release into the environment.

SLO 12B.8.2.2 Discuss energy efficiency and its benefits.

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

SLO 12B.8.3.1 Discuss the relationship between the state of the local economy and the repair of existing HVAC/R appliances, and the purchase of new appliances.

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

SLO 12B.9.1.1 Demonstrate an understanding of codes and regulations related to refrigeration and air conditioning 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 12B.10.1.1 Demonstrate critical-thinking and problem-solving skills.

SLO 12B.10.1.2 Demonstrate regular attendance and punctuality.

SLO 12B.10.1.3 Demonstrate accountability by taking responsibility for their actions.

SLO 12B.10.1.4 Demonstrate adaptability, initiative, and effort.

SLO 12B.10.1.5 Demonstrate the ability to accept and follow direction and feedback.

SLO 12B.10.1.6 Demonstrate the ability to stay on task and to use time in class and in the shop effectively.

SLO 12B.10.1.7 Demonstrate the ability to communicate respectfully with co-workers and customers.

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

SLO 12B.10.2.1 Demonstrate an awareness of the importance of record keeping (e.g., invoices, inventory, work orders, etc.) in 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 12B.11.1.1 Discuss the opportunities for employment in the refrigeration and air cooling 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 12B.12.1.1 Discuss new trends in energy efficiency in the marketplace and its effect on system complexity and service requirements.

