



Western Technical College

10601121 HVACR Introduction to Installation

Course Outcome Summary

Course Information

Description	The learner will design and install forced air duct system with fabricate sheet metal box, a gas furnace, install a residential air conditioner, and install a gas boiler and the components of a boiler and in floor heating system. Learners will take the EPA Refrigeration Handling Certification test. HVACR is a common reference to Heating, Ventilation, Air Conditioning and Refrigeration.
Career Cluster	Architecture and Construction
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	90

Textbooks

Refrigeration and Air Conditioning Technology-With CD. 8th Edition. Copyright 2017. Whitman, Bill, Bill Johnson, John Tomczyk, and Eugene Silberstein. Publisher: Cengage Learning. **ISBN-13:978-1-3055-7829-6**. Required.

Learner Supplies

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor:** Campus Shop. Required.

Program Outcomes

1. Install HVACR systems.
2. Analyze HVACR systems.
3. Design HVACR systems.

Course Competencies

1. **Fabricate sheet metal fittings.**
Assessment Strategies

1.1. Demonstration

Criteria

You will know you are successful when

- 1.1. you fabricate ducts for air distribution systems.
- 1.2. you identify the types of material used in air duct systems.
- 1.3. you fabricate fittings for an air duct system.
- 1.4. you assemble duct fittings.
- 1.5. you remove duct work in the HVACR lab according to the duct design plan.
- 1.6. you install duct work in the HVACR lab according to the duct design plan.

Learning Objectives

- 1.a. Practice how to fabricate ducts for air distribution systems.
- 1.b. Detail the various types of material used in air duct systems.
- 1.c. Fabricate fittings used in air duct system.
- 1.d. Assemble duct fittings.
- 1.e. Remove duct work work in HVACR lab according to duct design.
- 1.f. Install duct work in HVACR lab according to duct design plan.

2. Install gas or oil furnace.

Assessment Strategies

- 2.1. Demonstration

Criteria

You will know you are successful when

- 2.1. you meet qualifications for CSST Installation certification.
- 2.2. you follow the steps to vent flue gas and intake pipe.
- 2.3. you cut and thread black steel pipe.
- 2.4. you complete the installation of heating accessories.
- 2.5. you complete the installation of the ductwork to the furnace.
- 2.6. you list what is required in oil piping systems.
- 2.7. you use the manufacturer's installation instructions to complete installation.
- 2.8. you start up furnace using manufacturer's checklist.

Learning Objectives

- 2.a. Obtain certification for CSST installation.
- 2.b. Vent flue gas and intake pipe.
- 2.c. Cut and thread black steel pipe.
- 2.d. Install heating accessories.
- 2.e. Install ductwork to furnace.
- 2.f. Examine oil piping systems.

3. Install residential air conditioner/heat pump.

Assessment Strategies

- 3.1. Demonstration

Criteria

You will know you are successful when

- 3.1. you obtain EPA certification for refrigerant handling.
- 3.2. you mount an indoor coil.
- 3.3. you set an outdoor unit.
- 3.4. you construct refrigerant piping.
- 3.5. you install extra system components and accessories as instructed by faculty.
- 3.6. you use the manufacturer's installation instructions.
- 3.7. you start up system using manufacturer's checklist.

Learning Objectives

- 3.a. Complete EPA certification for refrigerant handling.
- 3.b. Mount indoor coil.
- 3.c. Set outdoor unit.

- 3.d. Construct refrigerant piping.
- 3.e. Install additional system components and accessories.
- 3.f. Use manufacturer's installation instructions.
- 3.g. Start up system using manufacturer's checklist.

4. Install in-floor heating system.

Assessment Strategies

- 4.1. Demonstration

Criteria

You will know you are successful when

- 4.1. you install tubing.
- 4.2. you use the manufacturer's installation instructions.
- 4.3. you start up system using manufacturer's checklist.
- 4.4. you install system components and accessories as instructed by faculty.

Learning Objectives

- 4.a. Install tubing.
- 4.b. Install system components and accessories.
- 4.c. Start up system using manufacturer's check list.
- 4.d. Use manufacturer's installation instructions.

5. Install boilers.

Assessment Strategies

- 5.1. Demonstration

Criteria

You will know you are successful when

- 5.1. you set boiler and install near boiler piping.
- 5.2. you vent flue gas and intake pipe.
- 5.3. you list various fuel systems.
- 5.4. you use the manufacturer's installation instructions.
- 5.5. you start up boiler using manufacturer's checklist.

Learning Objectives

- 5.a. Understand the operation of a hydronic heating system.
- 5.b. Set boiler and install near boiler piping.
- 5.c. Vent flue gas and intake pipe.
- 5.d. Explore different fuel systems.
- 5.e. Use manufacturer's installation instructions.
- 5.f. Start up boiler using manufacturer's checklist.