

Career & Technical Education Center  
HVAC 1 and 2 course syllabus  
Mr. Scott Conrad, Instructor  
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### **Office hours**

10:00am - 11:00 am  
Other times available by appointment

### **Course Description**

Prepares the student for employment in the HVAC field. Presents charging techniques, evaluation of systems, and leak detection. Explains component use, care, and troubleshooting of residential, commercial, and industrial systems. Studies basic electrical and refrigeration theories, gas/oil/heat pump systems, temperature/ pressure relationships, tools and equipment, soldering, brazing, sheet metal fabrication, load calculations, and duct sizing.

### **Textbook**

Refrigeration & Air Conditioning Technology; Author: Whitman, Johnson, Tomczyk, Silberstein; Copyright: 2009; Publisher Delmar, Cengage Learning

### **Course fees**

1<sup>st</sup> Year Student \$64.00  
\$48.00 for EPA Refrigerant Certification and \$16.00 Activity Fee  
2<sup>nd</sup> Year Student \$78.00  
\$62.00 for Refrigerant 410a Safety Certification and \$16.00 Activity Fee

### **Class Materials**

Coveralls or suitable shop work attire (preferably 100% cotton)  
Leather work gloves  
Rubber soled shoes/boots (steel toe recommended)  
Safety eyewear and ear protection provided  
Three Ring Binder, Paper, Pens, Pencils, Highlighters

## Evaluation of student performance/ Grading.

Employability skills (attendance,behavior, etc.)	30%
Related instruction (tests, quizzes, homework)	35%
Competencies (shop performance, labs)	35%

### Listing of Skills Topics

- 1) Applying basic construction safety standards**
  - a. Inspect and maintain a safe working environment
  - b. Identify first aid procedures
  - c. Pass safety test
- 2) Work with piping and tubing**
  - a. Cut and install pipe using a cemented joint
  - b. Cut, thread and install black iron pipe
  - c. Connect tubing using soft solder
  - d. Connect tubing using brazing methods
  - e. Connect tubing using flare fittings
- 3) Understanding basic electricity**
  - a. Read schematic diagram
  - b. Measure voltages in electrical circuits
  - c. Measure amperages in electrical circuits
  - d. Measure capacitance
  - e. Test for ground, open and shorts in circuits
  - f. Install electrical components
- 4) Understanding the theory of heat.**
  - a. Explain the changing states of matter
  - b. Learn and explain the refrigeration process
  - c. Explain the relationship of pressures and fluids at saturation temps
- 5) Service and install refrigeration systems**
  - a. Measure superheat and subcooling using manifold gauges
  - b. Evacuate and recharge a refrigeration system
  - c. Repair leaks in a refrigeration system
  - d. Replace a compressor
  - e. Locate leaks using various methods of leak detection
- 6) Understand motors and controls**
  - a. Install and troubleshoot a single phase motor
  - b. Troubleshoot and install start and run capacitors
  - c. Troubleshoot and install control transformers and contactors

## **7) Service and maintaining heating systems**

- a. Test for gas leaks
- b. Adjust pilot igniters
- c. Replace gas valve
- d. Replace and check gas orifice
- e. Determine fuel efficiency
- f. Clean and service furnace (gas and oil)
- g. Adjust primary air on oil furnace
- h. Adjust oil pump pressure
- i. Replace oil burner motor
- j. Identify and replace oil nozzle

## **8) Sizing and installing duct fittings**

- a. Install main trunk and fittings
- b. Fabricate plenum boxes and fittings
- c. Prepare openings for registers, grills and duct penetrations