

I. CATALOG DESCRIPTION:

A. Department Information:

Division: Refrigeration and Air Conditioning
Department: Refrigeration and Air Conditioning
Course ID: REFRIG 057A-Z
Course Title: Refrigeration and Air Conditioning I
Units: 3
Lecture: 3 Hours
Prerequisite: None

- B. Course and Schedule Description: This is the third term of a three-term national training course offered in conjunction with the Refrigeration Service Engineers Society and is a comprehensive study of heating controls, filtering, and cleaning equipment. This course is designed to help certify journeymen-level refrigeration technicians and keep their knowledge current. Department Advisory: HVAC Refrigeration work experience

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of this course, students will be able to:

- A. Select troubleshooting techniques that apply to oil-burner controls.
- B. Analyze and troubleshoot gas-burner controls and igniters.
- C. Maintain oil and gas control equipment.
- D. Inspect electric heat multi-step controllers.
- E. Assess the purpose of limit controls, flow switches, damper controls, air filters, and relief valves.
- F. Troubleshoot Hydronic system components.

IV. CONTENT:

- A. Troubleshooting an Oil Burner Controls
 - 1. Developing troubleshooting techniques
 - 2. Understanding oil burner controls
- B. Troubleshooting
 - 1. Oil system primary controls
 - 2. Oil burner controlled components
 - 3. System controlled components
- C. How a Typical Industrial Type Flame Safeguard Control Works
 - 1. Gas burner controls
 - 2. The combination gas control
 - 3. Ignition systems for infrared gas heaters
- D. Gas Heating Equipment Maintenance
 - 1. Troubleshooting the gas system
- E. Electric Heating
 - 1. System control devices
 - 2. Electric furnace
 - 3. Duct heaters
 - 4. Electric heat multistep controllers
 - 5. Electronic sequencing controls
 - 6. Decentralized electric heating system
 - 7. Electric boilers
- F. Troubleshooting Warm Air Systems
- G. Troubleshooting Hydronic System Components
 - 1. Automatic reset devices
 - 2. Flow switches

3. Water level control
4. Automatic room
5. Pressure reducing valves
6. Steam pressure switches
7. Traps and vents

V. METHODS OF INSTRUCTION:

Methods of instruction will vary from instructor to instructor but may include:

- A. Lectures and discussions about oil burner controls, igniters, maintenance, multi-step controllers and other Hydronic components.
- B. Lectures and discussions are complemented with handouts and instruction on different methods of analysis and troubleshooting.
- C. Dynamics are accented with the use of pictures, charts and videos.
- D. Homework is assigned to promote expertise, vocabulary, and writing skills.

VI. TYPICAL ASSIGNMENTS:

Typical assignments will vary from instructor to instructor but may include:

- A. Analyze and troubleshoot gas-burner controls and igniters.
- B. What is the difference in efficiency between a standard furnace and a high efficiency furnace?
- C. What is the procedure for troubleshooting the fan relay control center?

VII. EVALUATION:

A. Methods of evaluation will vary from instructor to instructor but may include:

1. Written tests
2. Final exam

Typical Questions:

- a. Why is a limit switch necessary?
- b. How does a pilot-less ignition system work?

B. Frequency of evaluation will vary from instructor to instructor but may include:

1. Three (3) written tests
2. One (1) final exam

VIII. TYPICAL TEXT:

Refrigeration Service Engineers Society, RSES Total Heating, Refrigeration Service Engineers Society, Des Plaines, IL, 2002

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: None