

**I. CATALOG DESCRIPTION:**

A. Department Information:

Division: Technology  
Department: Refrigeration and Air Conditioning  
Course ID: REFRIG 101x3  
Course Title: Refrigeration I  
Units: 4  
Lecture: 3 Hours  
Lab: 3 Hours  
Prerequisite: None

B. Course and Schedule Description: Basic principles of refrigeration, refrigerants, refrigeration components and tools; repair and testing of refrigeration units; and basic brazing and soldering.

**II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: Three (3)**

**III. EXPECTED OUTCOMES FOR STUDENTS:**

Upon completion of the first repetition of the course, students will be able to:

- A. Examine the fundamentals of refrigeration, such as interactions of temperatures and pressures and their relationship in a closed system.
- B. Distinguish between different trade tools, soldering, and brazing methods.
- C. Experiment with refrigerant tubing; cutting, bending, brazing, etc.
- D. Compare the purpose and operation of three different metering devices.
- E. Categorize refrigerants by numbers, colors, and pressures.
- F. Identify the different sections of a refrigeration system.
- G. Practice safety procedures.

Upon completion of the second repetition of the course, students will be able to:

- A. Illustrate improved skills and knowledge of the operation of a closed refrigeration system.
- B. Demonstrate tubing handling procedures; cutting, swedging, splicing, and bending.
- C. Explain the need for safety procedures.
- D. Develop skills and confidence while helping first-time students.

Upon completion of the third repetition of the course, students will be able to:

- A. Explain the operation of a typical closed refrigeration system.
- B. Appraise and critique tubing handling procedures; cutting, swedging, splicing and bending.
- C. Use improved skills and confidence while assisting the instructor.

**IV. CONTENT:**

- A. Fundamentals of Refrigeration
  - 1. Safety rules
  - 2. Refrigeration tools
  - 3. Pressure-temperature relationships
  - 4. Laws of thermodynamics
- B. Tubing and Fittings
  - 1. Brazing and soldering
  - 2. Tubing connections, bending, and cutting
- C. Refrigeration Systems and Terms
  - 1. Heat transfer theories
  - 2. Volumetric calculations
  - 3. Component identification and operation
  - 4. System operation and configuration

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5. Air compression properties
  6. Refrigerant composition and properties
- D. Instruments and Gages
1. Metering devices
  2. Compressor theory
  3. Evaporator and condenser theory

**V. METHODS OF INSTRUCTION:**

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

- A. Lecture and discussions about temperature/pressure relationships, closed refrigeration systems, tools, refrigerants, and safety procedures.
- B. Lectures and discussions are complemented with practical laboratory projects emphasizing system properties, methods of analysis and troubleshooting.
- C. Dynamics are accented with the use of show and tell demonstrations 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. Describe an easy way to check the accuracy of a thermometer.
- B. Demonstrate the proper set up procedure for an Oxy-acetylene torch set.
- C. Draw a pictorial configuration of a closed compression system.

**VII. EVALUATION:**

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

1. Written tests
2. Final exam

Typical Questions:

- a. Describe the basic operation of a refrigerator.
  - b. Discuss the differences between sensible heat, specific heat, and latent heat.
3. Practical evaluations, including a student lab notebook consisting of no less than ten, lab project reports.

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

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

C. Levels of evaluation upon repetition:

1. First enrollment:

Students are expected to have a good understanding of the refrigeration system and working knowledge of refrigeration tools.

2. Second enrollment:

Students are expected to have a thorough understanding of refrigeration tool handling, the system and an observable confidence while assisting the instructor in the laboratory.

3. Third enrollment:

Students are expected to show their knowledge, skill and confidence while working as group leaders in the laboratory and assisting the instructor in lecture demonstrations.

**VIII. TYPICAL TEXT:**

Althouse, Modern Refrigeration and Air Conditioning, Goodheart/Willcox, Tinley Park, IL, 2000

Althouse, Modern Refrigeration and Air Conditioning Study Guide, Goodheart/Willcox, Tinley Park, IL, 2000

Whiteman, B., Refrigeration & AC Technology, Delmar, NY, 2000

Dossat, R., Principles of Refrigeration, Prentice Hall, NY, 2002

**IX. OTHER SUPPLIES REQUIRED OF STUDENTS: None**