

COCONINO COMMUNITY COLLEGE

COURSE OUTLINE

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Effective Term: Fall 2020

Date: November, 2019

A. **Identification:**

1. Subject Area: Construction Technology Management (CTM)
2. Course: CTM 238
3. Course Title: Heating Ventilation, Air Conditioning and Refrigeration I
4. Credit Hrs.: 3
5. Catalog Description: Pre- or Co-requisites: CTM 150 and CTM 111. This course will focus and teach the Environmental Protection Agency (E.P.A) section 608 requirements for purchase, handling and disposal of refrigerant/freon used for HVACr system. Section 608 of the Clean Air Act which requires that all persons who maintain, service, repair, or dispose of appliances that contain regulated refrigerants, be certified. The class will also teach the fundamentals of the refrigeration cycle use for single family and multi-family dwellings used for comfort cooling, and appliance refrigeration. Two lecture. One lab.

B. **Course Goals:**

This course will:

Prepare and train the learner/student on in proper refrigerant handling techniques as required by the EPA's National Recycling and Emission Reduction Program. Develop a comprehensive understanding of the regulated refrigerant management use in residential and light commercial applications today. Create a universal understanding of the "refrigeration cycle" that applies to the majority of cooling refrigeration and freezing systems used in single family and multi-family dwellings.

C. **Course Outcomes:**

Students will be able to:

1. Identify and distinguish between the major types of regulated refrigerants.
2. Differentiate between the regulated refrigerant properties and composition.
3. Conceptualize and understand the universal refrigeration cycle process.
4. Become certified. This course will prepare the learner/student for the E.P.A. section 608 Certification exam as well as future recertification procedures and requirements.

D: **Course Outcomes Assessment**

1. Participation
2. Quizzes
3. HVACr exam structure for Universal Certification

- a. Core exam
- b. Type I exam
- c. Type II exam
- d. Type III exam
4. Final exam: E.P.A. section 608 exam for National Certification
5. Practical Troubleshooting analysis for HVACr defaults exam.

E. **Course Content:**

Will include:

1. O.S.H.A. Safety requirements for regulated refrigerants
2. HVACr Safety (lock out tag out, hand tools, P.P.E.)
3. Types of heating systems (electric forced air, gas forced air, electric baseboard, hydronic)
4. Mechanical, Electrical, Plumbing (MPE) Codes (IRC) and Standards Organizations
5. HVACr Refrigerant systems and principles and management
6. HVACr tools and equipment
7. HVACr measurement devices
8. Temperature, Pressure and Thermodynamics
9. Psychometrics Chart
10. Knowledge of all regulated refrigerants which include
 - a. CFC
 - b. HCFC
 - c. HFC
 - d. HFO
11. HVACr mechanical soldering, brazing, and connection techniques
12. HVACr building controls and automation systems
13. Basic heating controls (blower fan and relays, limit and pressure switches)
14. Thermostat controls on residential units (manual and smart)
15. HVACr troubleshooting, maintenance and operation (testing and balancing)