

Course Outline of Record

1. Course Code: ACR-078
2.
 - a. Long Course Title: Safe Refrigerant Handling & Management
 - b. Short Course Title: REFRIGERANT MGMT
3.
 - a. Catalog Course Description:
Presents current industry practices for recovery, reclamation, recycling and retrofitting. Emphasis is on safe use and management of common refrigerants as well as efficient use of pressure and temperature measurement to determine system operating parameters.
 - b. Class Schedule Course Description:
Industry practices for safe and efficient handling of common refrigerants.
 - c. Semester Cycle (if applicable): N/A
 - d. Name of Approved Program(s):
 - AIR CONDITIONING AND REFRIGERATION Certificate of Achievement
 - AIR CONDITIONING AND REFRIGERATION AS Degree for Employment Preparation
4. Total Units: 3.00 Total Semester Hrs: 72.00
 Lecture Units: 2.5 Semester Lecture Hrs: 45.00
 Lab Units: 0.5 Semester Lab Hrs: 27.00
 Class Size Maximum: 27 Allow Audit: No
 Repeatability No Repeats Allowed
 Justification 0
5. Prerequisite or Corequisite Courses or Advisories:
Course with requisite(s) and/or advisory is required to complete Content Review Matrix (CCForm1-A)
N/A
6. Textbooks, Required Reading or Software: (List in APA or MLA format.)
 - a. John Tomczyk; Eugene Silberstein, B.A., M.S., BEAP, CMHE; Bill Whitman; Bill Johnson (2017). Refrigeration Air Conditioning Technology (8th/e). Boston, MA 02210 Cengage Learning. ISBN: 978130557829
 College Level: Yes
 Flesch-Kincaid reading level: 11.1
7. Entrance Skills: *Before entering the course students must be able:*
8. Course Content and Scope:

Lecture:

1. Refrigerants and the environment
2. Ozone depletion
3. Global warming
4. CFC refrigerants
5. HCFC refrigerants
6. HFC and blended refrigerants
7. Refrigerant Oil properties
8. Clean Air Act regulations
9. Methods of recovery
10. Methods of recycling
11. Requirements for reclamation
12. Practice for EPA Section 608 national certification
13. Safe and efficient refrigerant charging practices
14. Psychometrics and Air Properties

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Lab: (if the "Lab Hours" is greater than zero this is required)

1. Safe refrigerant handling
2. Use of refrigerant gauges and thermometers
3. Refrigerant recovery using push pull, traditional and advanced techniques
4. Refrigerant leak checking
5. Evacuation using proper tools and micron guage
6. Proper system charging for fixed orifice, TXV/TEV, AXV/AEV & EXV/EEV
7. Air Flow Verification and system preformance Verification
8. Refrigerant containers and storage
9. Schrader core removal, low loss fittings and new hoseless electronic charging devices.

9. Course Student Learning Outcomes:

1. Obtain EPA Section 608 Universal Certification.
2. Safely and efficiently use industry tools to handle common refrigerants.
3. Safely and efficiently recover, leak check, evacuate and charge residential and light commercial a/c and refrigeration systems.

10. Course Objectives: *Upon completion of this course, students will be able to:*

- a. Describe ozone depletion and global warming
- b. Discuss the effects of CFC's on the ozone layer
- c. Differentiate between CFC's, HCFC's, HC's and HFC's
- d. Discuss replacement refrigerants and retrofitting
- e. Discuss refrigerant blends and glide.
- f. Describe differences in refrigerant oils and their correct applications
- g. Recover refrigerants, leak check, evacuate and charge systems
- h. Pass EPA Section 608 Universal Certification Exam

11. Methods of Instruction: *(Integration: Elements should validate parallel course outline elements)*

- a. Demonstration, Repetition/Practice
- b. Laboratory
- c. Lecture
- d. Technology-based instruction

Other Methods:

Reading assignments Computer simulation programs Hands on practice of recovery, evacuation, leak checking and charging tools

12. Assignments: *(List samples of specific activities/assignments students are expected to complete both in and outside of class.)*

In Class Hours: 72.00

Outside Class Hours: 90.00

a. Out-of-class Assignments

1. Periodic reading assignments
2. Review Questions
3. EPA study Guide
4. Computer exercises

b. In-class Assignments

1. Periodic reading assignments
2. Lab projects
3. Computer exercises

13. Methods of Evaluating Student Progress: *The student will demonstrate proficiency by:*

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- Laboratory projects
- Field/physical activity observations
- True/false/multiple choice examinations
- Mid-term and final evaluations
- Student participation/contribution

14. Methods of Evaluating: Additional Assessment Information:

Completion of lab and computer projects

15. Need/Purpose/Rationale -- *All courses must meet one or more CCC missions.*

PO - Career and Technical Education

Fulfill the requirements for an entry- level position in their field.

Apply critical thinking skills to execute daily duties in their area of employment.

Apply critical thinking skills to research, evaluate, analyze, and synthesize information.

Display the skills and aptitude necessary to pass certification exams in their field.

Exhibit effective written, oral communication and interpersonal skills.

IO - Critical Thinking and Communication

Apply principles of logic to problem solve and reason with a fair and open mind.

Summarize, analyze, and interpret oral and written texts, with the ability to identify assumptions and differentiate fact from opinion.

16. Comparable Transfer Course

University System	Campus	Course Number	Course Title	Catalog Year
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17. Special Materials and/or Equipment Required of Students:

18. Materials Fees: Required Material?

Material or Item

Cost Per Unit

Total Cost

19. Provide Reasons for the Substantial Modifications or New Course:

Periodic review

HVACR Programmatic Accreditation

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20. a. Cross-Listed Course (*Enter Course Code*): N/A
b. Replacement Course (*Enter original Course Code*): N/A

21. Grading Method (*choose one*): Letter Grade Only

22. MIS Course Data Elements

- a. Course Control Number [CB00]: CCC000513170
b. T.O.P. Code [CB03]: 94600.00 - Environmental Control Tec
c. Credit Status [CB04]: D - Credit - Degree Applicable
d. Course Transfer Status [CB05]: C = Non-Transferable
e. Basic Skills Status [CB08]: 2N = Not basic skills course
f. Vocational Status [CB09]: Clearly Occupational
g. Course Classification [CB11]: Y - Credit Course
h. Special Class Status [CB13]: N - Not Special
i. Course CAN Code [CB14]: N/A
j. Course Prior to College Level [CB21]: Y = Not Applicable
k. Course Noncredit Category [CB22]: Y - Not Applicable
l. Funding Agency Category [CB23]: Y = Not Applicable
m. Program Status [CB24]: 1 = Program Applicable

Name of Approved Program (*if program-applicable*): AIR CONDITIONING AND REFRIGERATION, AIR CONDITIONING AND REFRIGERATION

Attach listings of Degree and/or Certificate Programs showing this course as a required or a restricted elective.)

23. Enrollment - Estimate Enrollment

First Year: 25
Third Year: 30

24. Resources - Faculty - Discipline and Other Qualifications:

- a. Sufficient Faculty Resources: Yes
b. If No, list number of FTE needed to offer this course: N/A

25. Additional Equipment and/or Supplies Needed and Source of Funding.

N/A

26. Additional Construction or Modification of Existing Classroom Space Needed. (*Explain:*)

N/A

27. FOR NEW OR SUBSTANTIALLY MODIFIED COURSES

Library and/or Learning Resources Present in the Collection are Sufficient to Meet the Need of the Students Enrolled in the Course: Yes

28. Originator George Brown Origination Date 03/31/16