

Course Outline of Record

1. Course Code: ACR-378D
2.
 - a. Long Course Title: System Performance and Charging Procedures
 - b. Short Course Title: SYS PERFORM & CHRGNG
3.
 - a. Catalog Course Description:

This course is designed for to teach students how to properly prepare and charge an air conditioning system to meet or exceed industry standards and Enviromental Protection Agency (EPA) laws.
 - b. Class Schedule Course Description:

This course is focused on proper system charging.
 - c. Semester Cycle (*if applicable*): N/A
 - d. Name of Approved Program(s):
 - NEW CERTIFICATE IN PROGRESS Certificate of Completion
4. Total Units: 0 Total Semester Hrs: 18.00
 Lecture Units: 0 Semester Lecture Hrs: 6.00
 Lab Units: 0 Semester Lab Hrs: 12.00
 Class Size Maximum: 25 Allow Audit: No
 Repeatability Noncredit - Unlimited
 Justification 0
5. Prerequisite or Corequisite Courses or Advisories:

Course with requisite(s) and/or advisory is required to complete Content Review Matrix (CCForm I-A)

 Prerequisite: ACR 378B and
 Prerequisite: ACR 378C or EPA-608 Universal License
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:*
 - a.
 Demonstrate use of tools to evacuate an HVAC system and using a micron gauge distinguish the difference between a leaky HVAC system and a contaminated HVAC system.
 - ACR 378B - Demonstrate use of tools to evacuate an HVAC system and using a micron gauge distinguish the difference between a leaky HVAC system and a contaminated HVAC system.
 - b.
 Have EPA-608 License
 - ACR 378C - Acquire the (EPA-608 Universal refrigerant handling license) industry recognized credential
8. Course Content and Scope:

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Lecture:

1. Measuring air flow
2. Understanding airflow and the affects on system charging
3. Safe and efficient refrigerant charging practices
4. Non-invasive system performance evaluation

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

1. Proper system charging for various Metering devices including: fixed orifice, (Thermostatic Expansion Valve)TXV/TEV, (Automatic Expansion Valve) AXV/AEV & (Electronic Expansion Valve) EXV/EEV
2. Air Flow Verification and system performance Verification

9. Course Student Learning Outcomes:

1.
Demonstrate proper brazing practices and the use of nitrogen in the process.
2.
Explain the clean assembly process of air conditioning and refrigeration equipment.
3.
Differentiate between the proper system charging processes including weigh-in, superheat, sub-cooling, Air flow verification, and the approach methods.

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

- a. apply Proper system charging for fixed orifice, TXV/TEV, AXV/AEV & EXV/EEV
- b. Test for proper Air Flow and analyze system performance.

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

- a. Activity
- b. Laboratory
- c. Lecture
- d. Participation
- e. Technology-based instruction

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

In Class Hours: 18.00

Outside Class Hours: 36.00

a. In-class Assignments

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

b. Out-of-class Assignments

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

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

- Group activity participation/observation
- True/false/multiple choice examinations

14. Methods of Evaluating: Additional Assessment Information:

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

PO-BS Problem Solving

Use a variety of solution methods and techniques, for example, making a sketch, systematic listing, using the solution of a simpler (but related) problem.

Recognize the importance of checking a proposed solution to verify that it satisfies the requirements of a problem.

Identify what isn't known, but needs to be known in order to solve a problem (depending on the problem domain, reading and/or mathematical skills are helpful).

IO - Critical Thinking and Communication

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

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:

This course is necessary for training new employees in the proper methods of system charging and system evaluation. Recent energy studies have estimated that 80% of all residential Air Conditioning systems are either under or overcharged and even systems that are currently charged properly will become inefficient due to improper maintenance and service procedures.

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

b. Replacement Course (*Enter original Course Code*): *N/A*

21. Grading Method (*choose one*): Pass/No Pass Only

22. MIS Course Data Elements

a. Course Control Number [CB00]: CCC000582395

b. T.O.P. Code [CB03]: 94600.00 - Environmental Control Tec

c. Credit Status [CB04]: N - Noncredit

d. Course Transfer Status [CB05]: C = Non-Transferable

e. Basic Skills Status [CB08]: 2N = Not basic skills course

f. Vocational Status [CB09]: Possibly Occupational

g. Course Classification [CB11]: J - Workforce Preparation Enhanced Funding

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]: J - Workforce Preparation

l. Funding Agency Category [CB23]: Y = Not Applicable

m. Program Status [CB24]: 1 = Program Applicable

Name of Approved Program (*if program-applicable*): NEW CERTIFICATE IN PROGRESS

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

23. Enrollment - Estimate Enrollment

First Year: 15

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Third Year: 25

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 09/19/16