



Course Number and Title: ACR 104 Residential Climate Control

Campus Location:

Georgetown

Effective Date:

2020-51

Prerequisite:

ACR 101, ACR 102, ENG 090 or ENG 091, SSC 100 or concurrent

Co-Requisites:

None

Course Credits and Hours:

5.00 credits

4.00 lecture hours/week

4.00 lab hours/week

Course Description:

This course introduces students to residential air conditioning and heat pump systems. Design characteristics, components, operation, and service are covered. Emphasis is placed on proper installation and troubleshooting procedures. Hands-on training with emphasis placed on mastery of skills and competency in assigned tasks is provided.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

None

Schedule Type:

Classroom Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Investigate the function of components used in air conditioning systems. (CCC 1, 4; PGC 2, 3, 4)
2. Examine conditions that affect the operations and efficiency of air conditioning systems. (CCC 2, 6; PGC 4)
3. Troubleshoot and service air conditioning and heat pump systems. (CCC 2, 3, 4, 5; PGC 3, 4, 6)
4. Evaluate installation procedures and the operation of a typical air conditioner and heat pump system. (CCC 1, 2; PGC 1, 2, 5, 6, 7)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Investigate the function of components used in air conditioning systems.
 1. Discuss the factors involved with providing body comfort.
 2. Describe how the body produces and rejects heat.
 3. Identify and describe the purpose of components used in air conditioning systems.
 4. Describe different types of air conditioning equipment.
 5. Identify different types of compressors used in air conditioning systems.
 6. Explain the proper installation and placement of air conditioning equipment, thermostats, and related controls.
 7. Explain the operation of low voltage thermostats.
 8. Discuss heating and cooling anticipators.
 9. Describe operating and safety controls.
2. Examine conditions that affect the operations and efficiency of air conditioning systems.
 1. Describe terms used on a psychrometric chart.
 2. Graph air conditions on a psychrometric chart and interpret findings (e.g., relative humidity, dew point, and grains of moisture per pound of dry air).
 3. Identify design conditions of air conditioning systems.
 4. Discuss the effects of different conditions on an air conditioning system.
 5. Describe the different efficiencies and how air conditioning equipment is rated.
 6. Discuss the different methods of charging procedures.
3. Troubleshoot and service air conditioning and heat pump systems.
 1. Use refrigerant recovery equipment to meet industry standards.
 2. Evacuate a typical split system and monitor with a vacuum analyzer.
 3. Calculate and weigh charge for a split system air conditioner.
 4. Check system current draw, temperature drop, and system pressures on a typical central air conditioning system.
 5. Check system superheat and subcooling on a typical central air conditioning system and heat pump system in order to determine whether the systems are operating properly.
 6. Describe the performance of the heating and cooling cycle of an air-to-air heat pump.
 7. Diagnose the performance of the compressor and related starting components.
 8. Diagnose the performance of the low voltage circuit (including the transformer).
 9. Check line voltage controls (including fuses or circuit breakers).
 10. Confirm proper operation of defrost controls.
 11. Evaluate installation procedures and the operation of a typical air conditioner and heat pump system.
 12. Discuss the components of an air-to-air heat pump.
 13. Identify the conditions and ratings of heat pumps and the conditions of each mode of the heat pump system.
 14. Identify heat pump thermostats and related wiring of low voltage controls.
 15. Describe the different types of defrost systems and defrost controls.
 16. Describe charging methods for heat pump systems.
 17. Perform a leak check using nitrogen.
 18. Wire low voltage thermostats for proper operation of typical air conditioning and air-to-air heat pump systems.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Final Course Grade:

Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Quizzes (Formative) (equally weighted)	25%
Competency Exams (2) (Summative) (equally weighted)	40%
Lab Competency (Summative) (equally weighted)	25%
Case Study Sets (Summative) (equally weighted)	10%
TOTAL	100%

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

RHAAASRHA

1. Demonstrate professional behaviors that satisfy workplace expectations and include adherence to safety and environmental concerns related to the field.
2. Service commercial refrigeration and residential heating, ventilation, and air conditioning (HVACR) systems, and interpret related electrical wiring diagrams and schematics.
3. Apply theories of electricity and high and low voltage controls to the HVACR field.
4. Explain scientific principles as they relate to HVACR system operations.
5. Safely use tools, instruments, and equipment related to the HVACR industry.
6. Explain the principles of operation, service, and repair of residential HVACR and commercial refrigeration systems.
7. Identify best practices for proper installation of HVACR equipment and systems.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.