



## Course Number and Title: ACR 202 Commercial Refrigeration

**Campus Location:**

Georgetown

**Effective Date:**

2018-51

**Prerequisite:**

ACR 101, ACR 102, ACR 120, ENG 101, (MAT 120 or higher)

**Co-Requisites:**

None

**Course Credits and Hours:**

3.00 credits

2.00 lecture hours/week

4.00 lab hours/week

**Course Description:**

This course introduces the student to refrigeration systems used in light commercial applications. It includes low temperature systems, water cooled equipment, piping, and servicing restaurant equipment.

**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:**

Basic Calculator

**Schedule Type:**

Classroom Course

**Disclaimer:**

None

**Core Course Performance Objectives (CCPOs):**

1. Examine the operation of a chilled water refrigeration system. (CCC 6; PGC 2)
2. Distinguish between the operating characteristics of water and air cooled systems. (CCC 5, 7; PGC 2)
3. Examine compression ratio and volumetric efficiency. (CCC 6; PGC 4)
4. Troubleshoot systems using thermostatic expansion valves. (CCC 2, 3, 6; PGC 1, 5, 6)
5. Evaluate the operation of refrigerant controls used in commercial applications. (CCC 1, 2, 6; PGC 2)
6. Analyze the operation of electrical controls used in commercial applications. (CCC 4, 6; PGC 1, 3)
7. Examine the different types of defrost systems used in low temperature applications. (CCC 5, 6; PGC 2, 7)
8. Determine compressor malfunctions caused by flooded starts, slugging, and continuous flood-back. (CCC 1, 2, 4, 6; PGC 2, 7)
9. Examine the operation of a typical ice machine. (CCC 4; PGC 2)

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. Examine the operation of a chilled water refrigeration system.
  1. Explain how flooded evaporators (chillers) work.
  2. Review the function of air handling units and room air terminals.
  3. Discuss the operation of control valves and zone dampers.
2. Distinguish between the operating characteristics of water and air cooled systems.
  1. Analyze the dependency of discharge pressure on changes in ambient temperature.
  2. Discuss the process by which water is circulated through a water cooled condenser.
  3. Calculate discharge pressure on a water cooled condenser.
  4. Identify methods of head pressure control for forced air condensers.
  5. Identify the different types of water cooling towers and their operation.
3. Examine compression ratio and volumetric efficiency.
  1. Compute the compression ratio of a reciprocating compressor.
  2. Analyze the dynamics of volumetric efficiency in a reciprocating compressor.
  3. Explain how refrigerant is compressed and discharged in a compressor cylinder.
4. Troubleshoot systems using thermostatic expansion valves.
  1. Explain the purpose and operation of thermostatic expansion valves.
  2. Analyze the operating pressures that modulate a thermostatic expansion valve.
  3. Analyze a system's reaction to a malfunctioning thermostatic expansion valve.
5. Evaluate the operation of refrigerant controls used in commercial applications.
  1. Examine the operation of an evaporator pressure regulator.
  2. Examine the operation of a compressor pressure regulator.
  3. Discuss the purpose of using an external equalized expansion valve.
6. Analyze the operation of electrical controls used in commercial applications.
  1. Identify the conditions of operation for an oil pressure safety control.
  2. Discuss the purpose and sequence of operation of the controls for an automatic pump-down system.
  3. Apply the procedural steps used to calculate and calibrate low and high pressure controls.
7. Examine the different types of defrost systems used in low temperature applications.
  1. Differentiate among hot gas, off cycle, and electric defrost systems.
  2. Troubleshoot and wire electrical controls related to electric defrost.
  3. Discuss the sequence of operation for an electric defrost system.
8. Determine compressor malfunctions caused by flooded starts, slugging, and continuous flood-back.
  1. Explain how to prevent flooded starts, slugging, and continuous flood-back.
  2. Discuss what causes flooded starts, slugging, and continuous flood-back.
  3. Identify possible damage sustained from flooded starts, slugging, and continuous flood-back.
9. Examine the operation of a typical ice machine.
  1. Outline the sequence of operation of typical ice machines.
  2. Trace wiring schematics to show operating cycles of typical ice machines.
  3. Calculate ice machine production rates.
  4. Discuss the procedure for cleaning an ice machine.
  5. Troubleshoot common ice machine malfunctions.

### 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.

### 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):**

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.