

Chattanooga State Community College
Chattanooga, Tennessee
Tennessee College of Applied Technology (TCAT)
First Semester Syllabus of Three-Semester Course

VT-000- HVAC/R Technician

Instructor Information

Instructor Name:

Kyle Lee (Morning Instructor)
Houston Graham (Evening Instructor)

Class Room:

TCAT 2 (room 66)

Office:

TCAT 2 (room 66A) **Hours** 7:15 pm to 3:15 pm (Morning Instructor)
TCAT 2 (room 66A) **Hours** 3:15 pm to 11:15 pm (Evening Instructor)

Phone

423-697-3173 (Morning Instructor)
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Catalog Course Description:

A combination of classroom and shop learning experiences used in the air conditioning and refrigeration program, which includes mechanical theory application, operation, and maintenance of basic and advanced air conditioning/refrigeration systems. In addition, students learn about the different heating, gas, oil, electric, solar, and heat pump systems. Graduates find career opportunities as air conditioning/refrigeration technicians; sales, retail, and wholesale representatives; installers; maintenance and service; engineer helper; or operator. Full-time day and evening courses are available on the main campus.

Prerequisites:

None

Co-requisites:

Mathematics for Air Conditioning and Refrigeration

Entry Level Standards:

COMPASS Diagnostic test is used for all programs except LPN, Medical Assistant, Surgical Technology and Massage Therapy, which require the college COMPASS Test and the Volkswagen Mechatronics Programs that require the ACT or College Compass Test.

Textbook/Materials:

Refrigeration and Air Conditioning Technology, Newest Edition Tomczyk. Publisher (Delmar Cengage Learning): eBook (see note below)

Practical Problems in Mathematics for Heating and Cooling Technicians, Newest Edition Russell DeVore. Publisher (Delmar Cengage Learning): eBook (see note below)

NOTE: Both books are included in the Cengage Unlimited 12 month Instant Access ISBN 9780357700013

Required Student Learning Outcomes:

Institutional Learning Objectives (ISLO)

[\(List of ISLOs\)](#)

1. Communication Skills (Written and Oral)
2. Critical Thinking Skills
3. Information Literacy
4. Global and Cultural Awareness
5. Quantitative Literacy
6. Work Ethic
7. Competence in a Specialty

Program Student Learning Outcomes (PSLO)

1. Demonstrate oral, written and electronic communication techniques including non-verbal skills to gather, express, and transfer information in communicating with others. (ISLO 1)
2. Identify, analyze, contrast and compare, and apply knowledge to solve problems and obtain solutions in practical situations within a specialty. (ISLO 2)
3. Demonstrate basic IT skills for research, communication and analysis of specialty specific problems. (ISLO 3)
4. Demonstrate fundamental knowledge of cross-cultural awareness as applied in a business or industrial setting. (ISLO 4)
5. Develop and apply practical knowledge, skills and abilities in a specialty that meets or exceeds industry standards. (ISLO 5)
6. Work in teams or groups, when appropriate, to achieve goals. (ISLO 6)
7. Correctly apply professional and ethical standards unique and normally encountered in a student's specialty. (ISLO 7)
8. Demonstrate punctual and consistent attendance. (ISLO 6)

Course Student Learning Outcomes (CSLO)

1. Demonstrate industry based punctuality, attendance, and shop maintenance. (PSLO 5,6,7,8)
2. Understand the basic refrigeration cycle and the components. (PSLO 1,2,3,4,5,6,7)
3. Demonstrate knowledge of piping and brazing used in HVAC/R industry through testing. (PSLO 1,2,3,4,5,6,7,8)
4. Understand the various ways of recovering a system using EPA approved procedures. (PSLO 1,2,3,5,6,7)
5. Understand the various ways of evacuating a system using EPA approved procedures. (PSLO 1,2,3,4,5,6,7)

6. Understand the various ways of charging a system using EPA approved procedures. (PSLO 1,2,3,5,6,7)
7. Pass section 608 Environmental Protection Agency EPA certification exam. (PSLO 1,2,3,4,5,6,7,8)
8. Develop knowledge of basic electricity and how used in the HVAC/R industry. (PSLO 1,2,3,4,5,6,7)
9. Identify, correctly wire, and diagnose the various types of motors used in the heating, air conditioning, and refrigeration field. (PSLO1,2,3,4,5,6)

Learning Indicators:

The student's ability to demonstrate the following will be indicators of their success in achieving the program and course level, student learning outcomes.

1. Develop awareness of shop area and procedures to understand the necessity to work in safe manner. (CSLO 1)
 - a. Identify shop exits
 - b. locates fire extinguishers
 - c. locate first aid kit
 - d. locate eye wash stations
 - e. Complete chapters 4.
2. Understand the basic refrigeration components and their function. (CSLO 1,2,3)
 - a. Identify the components of the basic refrigeration system
 - b. Understand the change of state of the refrigerant
 - c. Understand the function of each component
 - d. Complete chapters 1, 2, 3
3. Identify and understand how to use HVAC/R specific tools. (CSLO 1,2,3)
 - a. Identify all HVAC tools
 - b. Understand the purpose of each tool
 - c. Complete chapters 5, 11
4. Demonstrate knowledge of piping, brazing and how used in the HVAC/R industry. (CSLO 1,2,3)
 - a. Identify the various types of piping
 - b. Demonstrate cutting, deburring, swaging and brazing
 - c. Complete chapters 6, 7, 8
5. Understand the recovery process. (CSLO 1, 2, 3, 4, 7)
 - a. Identify the steps of recovery
 - b. Understand the recovery machines function
 - c. Follow the proper procedures to perform recovery.
 - d. Complete chapter 9
6. Understand the recovery process. (CSLO 1, 2, 3, 4, 5, 7)
 - a. Identify the steps of recovery
 - b. Understand the recovery machines function
 - c. Follow the proper procedures to perform a recovery.
 - d. Complete chapter 8
7. Understand the different charging methods. (CSLO 1, 2, 3, 4, 5, 6, 7)
 - a. Identify the steps of charging for each method
 - b. Follow the proper procedures and charge a

- system.
 - c. Complete chapter 10
- 8. Demonstrate knowledge of basic electricity and how used in the HVAC/R industry. (CSLO 1, 8, 9)
 - a. Understand OHM,s law and how it affect electrical circuits
 - b. Use a multi meter to test electrical systems
 - c. Learn the symbols used in electrical schematic
 - d. Memorize OHM's law, Series' laws and Parallel laws
 - e. Complete chapters 12.
- 9. Electrical components, controls and schematics used in HVAC/R industry. (CSLO 1, 8, 9)
 - a. Understand transformers, relays, capacitors and thermostats
 - b. Use a multi meter to bench and live test each electrical component
 - c. Demonstrate wiring a complete electrical system for all types of systems
 - d. Complete chapters 13, 14, 15, 17.
- 10. Identify the electric motors used in HVAC/R Industry. (CSLO 1,8,9)
 - a. Learn to draw and wire the various type of electric motors b. Identify the components that make up each motor
 - b. Demonstrate drawing and wiring each motor into a circuit
 - c. Complete chapters 18, 19 and 20.

Required Assessment:

Assessment Names and Descriptions:

1. **Safety Test:** Chapter 4 Demonstrate the ability to assess a shop area for safety and emergency needs and apply safe working practices in the shop environment of the HVAC/R industry. (CSLO
2. **Basic Refrigeration Cycle:** Chapter 3 Understand the basic refrigeration cycle and the components. (CSLO 1, 2)
3. **System Recovery:** Chapter 9 Understand the various ways of recovering a system using EPA approved procedures. (CSLO 1, 2, 3)
4. **System Evacuation:** Chapter 8 Understand the various ways of evacuating a system using EPA approved procedures. (CSLO 1, 2, 3, 4)
5. **System Charging:** Chapter 10 Understand the various ways of charging a system using EPA approved procedures. (CSLO 1, 2, 3, 4, 5)
6. **Section 608 EPA Certification:** Pass section 608 Environmental Protection Agency EPA certification exam. (CSLO 1, 2, 3, 4, 5, 6)
7. **Electricity:** Chapter 12 Develop knowledge of basic electricity and how used in

the HVAC/R industry. (CSLO 1, 7)

- 8. Motors:** Chapter 17 Identify, correctly wire, and diagnose the various types of motors used in the heating, air conditioning, and refrigeration field. (CSLO 1, 7, 8)

CSLO/Assessment Alignment and grade distribution:

Assessment	CSLO	PSLO
Safety Test	CSLO 1	PSLO 5
Basic Refrigeration Cycle	CSLO 1, 2	PSLO 1
System Recovery	CSLO 1, 2, 3	PSLO 2
System Evacuation	CSLO 1, 2, 3, 4	PSLO 3
System Charging	CSLO 1, 2, 3, 4, 5	PSLO 4
Section 608 EPA Certification	CSLO 1, 2, 3, 4, 5, 6	PSLO 7
Electricity	CSLO 1, 7	PSLO 8
Motors	CSLO1, 7, 8	PSLO 6

Grade Distribution

ELearn Exams 40%

Review Questions 40%

EPA Certification 10%

Attendance 10%

Grading Scale or Policy

Letter grades in the current catalog:

A = 90-100%

B = 80-89%

C = 70-79%

F = 69.99% or below

Instructor Policies

Instructor Policy 1

Cellphones or other media devices, not allowed in class at any time.

Instructor Policy 2

You must have a parking decal and student ID by the 6th day of class.

Instructor Policy 3

You must have your books in class everyday starting on the 10th day of class. You must have all required tools in class everyday starting on the 30th day of class.

Instructor Policy 4

You are to follow all Instructor, TCAT and Chattanooga State policies. Located in eLearn site.

College Policy Statements:

This class is governed by the policies and procedures stated in the current Chattanooga State Student Handbook. [College Policies](#).

TCAT Attendance Policies

TCAT programs are clock hour based and require students to complete (91%)* of the program clock hours with a grade of (A, B, or C)* to meet the “Satisfactory Academic Progress” and be eligible for graduation. Students who receive a grade of “F” for a semester will not receive any clock hour credit toward program completion. Students must complete 91% of the program clock hours and have a minimum cumulative grade point average of 2.0 to graduate. *some programs, because of state regulations and/or licensing requirements, exceed 91% attendance and define a passing grade as an “A” or “B.” It is the student’s responsibility for clocking in and out.

NOTE: Instructor reserves the right to modify this syllabus at any time with written notification to the students.

Last Updated: 06/15/2021 HJG