



## Course Number and Title: ACR 101 HVAC Electricity

**Campus Location:**

Georgetown

**Effective Date:**

2020-51

**Prerequisite:**

ENG 006 or ENG 007), MAT 005, 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 is designed to familiarize the student with electric fundamentals as applied to heating, ventilating, and air conditioning. Basic circuits, Ohm's law, meters, motor theory, and circuit control are covered. Emphasis is placed on wiring components and reading schematics. Hands-on training is provided with emphasis placed on mastery of skills and competency of assigned tasks.

**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. Apply key definitions and electrical properties within heating, ventilation, air conditioning, and refrigeration (HVACR). (CCC 5, 6; PGC 3, 4)
2. Describe the function and operational characteristics of electrical components and testing instruments. (CCC 1, 2, 6; PGC 3, 4, 5, 6)
3. Wire and troubleshoot HVACR electrical circuits. (CCC 2, 3, 4, 5, 6; PGC 1, 2, 3, 5, 6, 7)
4. Examine electrical circuits' nature and theory to determine characteristics and operational sequences. (CCC 2, 5; PGC 2, 3, 6)

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. Apply key definitions and electrical properties within heating, ventilation, air conditioning, and refrigeration (HVACR).
  1. Define the units of electricity such as watts, ohms, volts, and amperes.
  2. Discuss capacitance, inductance, reactance, and impedance principles, purposes, and applications.
  3. Calculate voltage, current, and resistance using Ohm's law.
  4. Discuss atomic theory and its relationship to electron flow.
  5. Discuss electrical potential, current flow, and resistance.
  6. Identify wire size as it relates to the National Electrical Code.
2. Describe the function and operational characteristics of electrical components and testing instruments.
  1. Explain the operational characteristics of analog and digital meters.
  2. Explain power sources, electrical loads, switches, transformers, relays, and contactors.
  3. Explain the operation and application of single-phase motors and their components.
  4. Describe the various types of motor overload protection devices and their applications.
  5. Demonstrate the safe and proper use of the voltmeter, ohmmeter, and ammeter.
  6. Identify the common, start, and run terminals with single-phase motors.
  7. Describe the operational characteristics of current and potential relays.
3. Wire and troubleshoot HVACR electrical circuits.
  1. Wire split-phase motors with appropriate starting components.
  2. Install current and potential relays for applicable motor types.
  3. Diagnose the condition of any capacitor.
  4. Perform capacitor substitutions.
  5. Comply with National Electrical Code regulations while completing circuits.
  6. Wire series and parallel circuits to include line and low voltage components, multi-function relays, switches, and multiple loads from an electrical schematic.
  7. Interpret the readings on digital and analog multi-meters to determine operational status of circuit components while troubleshooting.
4. Examine electrical circuits' nature and theory to determine characteristics and operational sequences.
  1. Predict sequences of operation from an electrical schematic.
  2. Determine the electrical characteristics of series and parallel circuits.
  3. Explain direct- and alternating-current generation and circuit characteristics.
  4. Identify the common residential voltages.
  5. Compare and contrast single-phase and three-phase power.
  6. Identify the symbols for relays, loads, and switching devices.
  7. Break circuits down into simple series circuits in order to analyze load properties.
  8. Identify opens, shorts, continuity, and a measurable resistance within circuits.

**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)	50%
Lab Competency (Summative) (equally weighted)	25%
<b>TOTAL</b>	<b>100%</b>

**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.