AIRC 104
Basic HVAC Electricity

4 Credits: (2 hours lecture, 4 hours lab)

Community College of Baltimore County
Common Course Outline

Description

AIRC 104 – Basic HVAC Electricity: introduces the principles of electricity used in the Heating, Ventilation, and Air Conditioning (HVAC) industry including the proper use of test equipment, electrical circuits, and component theory and operation. An overview of the installation and servicing techniques for wiring and connecting circuitry for HVAC systems and the various electrical components and wiring methods needed to wire HVAC equipment and meet electrical codes are provided.

Overall Course Objectives

Upon completion of this course, students will be able to:

1. demonstrate safety procedures used while working with electrical circuits;
2. define electrical terms such as resistance, voltage, and current;
3. use Ohm's law and/or the power formula to calculate values for volts, amps, ohms, and watts;
4. identify HVAC schematic symbols and diagrams;
5. use schematic diagrams to describe the operating sequence of standard HVAC equipment;
6. demonstrate ability to properly use voltmeter, ammeter, ohmmeter, and various other test and measuring equipment;
7. identify the basic types of single phase and three phase motors used in HVAC;
8. demonstrate safe work habits and proficiency using the basic tools of the trade in a laboratory environment;
9. explain the difference between conductors and insulators;
10. explain how a capacitor works in an alternating current (AC) circuit;
11. recognize open and short circuits;
12. diagnose failures in the electrical controls of the HVAC systems to determine needed repairs;
13. diagnose temperature control problems in the HVAC system to determine needed repairs;
14. take measurements on a de-energized circuit with a test meter;
15. test HVAC motors, resistors, switches, relays, wiring, and protection devices to repair or replace as needed;
16. verify correct operation and maintenance of refrigerant handling equipment; and
17. explain the operation of electronically commutated motor (ECM) motors.

Major Topics

I. Alternating current circuit fundamentals

II. Ohm's Law calculations
III. Electrical safety procedures
IV. Proper use and care of test instruments
V. Components used in most HVAC systems
VI. Wiring diagrams and wiring method
VII. Motor types and principles
VIII. Control components used in HVAC

Course Requirements

Grading will be determined by the individual faculty member, but shall include the following, at minimum:

- Midterm exam
- 12 homework/lab assignments
- Final exam
- Attendance and active participation

Other Course Information

This course includes a hands-on lab portion and a lab fee is required.

Date Revised: 12/7/2021