

SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Electrician Construction Program
Revision Date: November 21, 2024

I. CATALOG DESCRIPTION

Course Number: ELET1711
Course Title: DC Theory II, Conduit Fab II and Blueprints
Prerequisite(s): ELET1710
Corequisite(s): None
Catalog Description: A more in-depth study of DC theory and the properties of DC electrical circuits. A more comprehensive study of Conduit Bending, the different types of raceways and their applications. The introductory course on blueprint reading will be covered, this would include learning the different scales used, how to identify blueprint symbols used on a residential print and learn about specifications and how they are used. Learn how to accurately take electrical measurements using a digital multimeter.
Credit Hours: 4
Class Hours: 45
Lab Hours: 45
Total Contact Hours: 90

II. COURSE OBJECTIVES: *Course will:*

- A. Continue to build upon what was learned in course ELET1710 as well as introduce new concepts and work processes.
- B. Examine DC theory and its concepts as they relate to electrical work.
- C. Introduce the student to Blueprint reading and the symbols that are associated with them.
- D. Demonstrate advanced concepts of Conduit Bending.
- E. Introduce the student to the concept of Ohm's law and its formulas.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Develop critical thinking skills related to DC circuits.
 - 2. Relate operations of the basic DC circuit components to application in electronic circuits.
 - 3. Demonstrate problem-solving techniques in troubleshooting DC circuits.
 - 4. Define various sources of DC electricity, including batteries.
 - 5. Explain the meaning and relationship of electrical quantities such as voltage, current, resistance, conductance, and power using Ohm's Law.
 - 6. Demonstrate the ability to bend 3 & 4 bend saddles with 100% accuracy.
 - 7. Develop the ability to measure electrical quantities with analog and digital multimeters.
 - 8. Construct and troubleshoot DC circuits.
 - 9. Demonstrate the ability to draw basic blueprint sketches.
 - 10. Draw electrical & mechanical symbols used on blueprints with 100% accuracy.
 - 11. Recognize the common scales used on blueprints.
 - 12. Demonstrate the ability to read and understand blueprint specifications.
- B. General Education Learning Outcomes (GELOs)
 - 1. GELO #5: Analytical, Quantitative, and Scientific Reasoning

Outcome 3: Effectively develop strategies, algorithms, or experiments (or performing experiments) to better describe the systems or to solve the problems.

IV. CONTENT/TOPICAL OUTLINE

- A. SECTION 1**
 - 1. What is electricity?
 - 2. Electrical energy sources.
 - 3. Electrical switches.
 - 4. Conductors, conductor resistance, and wattage loss.
 - 5. Introduction to electrical devices.
 - 6. Current, voltage, and resistance in a circuit.
 - 7. The electrical circuit and Ohm's law.
 - 8. Power in the circuit.
 - 9. How current reacts in DC series circuits.
 - 10. How voltage functions in DC series circuits.
 - 11. How to calculate power in a DC series circuit.
 - 12. Energized circuits and the potential hazards they present.
 - 13. How to draw basic electrical circuits correctly.
 - 14. Introduction to test instruments.
- B. SECTION 2**
 - 1. How current reacts in DC parallel circuits.
 - 2. Understanding resistance in DC parallel circuits.
 - 3. Working with ratios and proportion.
 - 4. How voltage functions in DC parallel circuits.
 - 5. How to calculate power in DC parallel circuits.
 - 6. Understanding resistance in DC combination circuits.
 - 7. How current reacts in a DC combination circuit.
 - 8. How voltage functions in a DC combination circuit.
 - 9. How to calculate power in DC combination circuits.
 - 10. How voltage and current dividers work.
 - 11. The design and operation of the three-wire, single-phase system.
- C. SECTION 3**
 - 1. Hand bending – three- and four- bend saddles.
 - 2. Push-through bending: 90° bends.
 - 3. Bending kicks, offsets and saddles using the push-through method.
- D. SECTION 4**
 - 1. Applying the principles of superposition to circuit calculations.
 - 2. Kirchhoff's laws.
 - 3. Thevenin's and Norton's theorems.
 - 4. Understanding the principles of magnetism.
 - 5. Understanding the principles of electromagnetism.
 - 6. DC generators and motors.
 - 7. Using DC theory to solve real world problems.
- E. SECTION 5**
 - 1. The fundamentals of blueprint drawing and how to make proper sketches.
 - 2. Understanding architectural views and how to draw them.
 - 3. Recognizing and understanding common scales used on blueprints.
 - 4. ICP 1: math for blueprint reading.
 - 5. Using blueprint specifications, elevations and schedules properly.
 - 6. Understanding and drawing electrical symbols used on blueprints.
 - 7. Understanding and drawing mechanical symbols used on blueprints.

8. Understanding how to properly use a residential blueprint.
 9. Reading and analyzing a residential blueprint.
- F. SECTION 6**
1. Electrical industry applications labs that include:
 - a. Using a hacksaw.
 - b. Lifting and carrying conduit.
 - c. Installing a Raceway support system (trapeze).
 - d. Cutting a hole in a metal enclosure for an EMT connector.
 - e. Exothermic welding of copper conductors.

V. INSTRUCTIONAL MATERIALS

- A. Required Text(s):**
1. *Electrical Industry Applications Manual, ETA*
 2. *Blueprint Reading for Electricians, ETA*
 3. *Building a Foundation in Mathematics Textbook, ETA*
 4. *Conduit Bending and Fabrication Textbook, ATP*
 5. *Conduit Fabrication Lab Manual, ATP*
 6. *DC Theory Textbook, ATP*
 7. *Electrical Systems based on 2023 NEC – ATP*
 8. *Residential Blueprints, ETA*
 9. *Test Instruments – ATP*
 10. *Ugly's Electrical References Book -2023 Edition*
 11. *NFPA 70 National Electrical Code – 2023 Edition*
- B. Other Resources:** Instructor handouts, National Electric Code and References available at the Lincoln Electrical Joint Apprenticeship and Training Committee Training Center.

VI. METHODS OF PRESENTATION/INSTRUCTION

- A. Methods of presentation typically include a combination of the following:**
1. Lecture
 2. Discussions
 3. Demonstration

VII. METHODS OF EVALUATION

- A. Methods of evaluation typically include a combination of the following:**
1. Quizzes
 2. Tests and exams.

VIII. SPECIFIC COURSE REQUIREMENTS

- A.** The students will maintain an average of 80% (B) or more on the quizzes, tests and exams or the IBEW can drop them from the program.
- B.** Credit by Examination: Credit for this course CANNOT be earned through Credit by Examination.