

SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Manufacturing Engineering Technology Program
Revision Date: August 2025

I. CATALOG DESCRIPTION

Course Number: MFGT1413
Course Title: Electrical Fundamentals for Manufacturing
Prerequisite(s): MATH1050 or higher, **MFGT1351**
Catalog Description: Fundamental concepts of electricity, circuits and devices. Application of Ohm's Law and power, involving basic circuits. Discussions of sources and effects of electric current, magnetism and electromagnetism. Introduction to industrial electrical controls devices and wiring. Uses American Standard Association and National Electrical Component Association Standards.
Credit Hours: 3
Class Hours: 30
Lab Hours: 45
Total Contact Hours: 75

II. COURSE OBJECTIVES: *Course will:*

- A. Demonstrate DC/AC electrical fundamentals.
- B. Calculate circuit values using Ohm's Law.
- C. Interpret electrical schematics and industrial electrical control diagrams.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Describe electrical properties i.e. Voltage, Current, Resistance, and Power.
 - 2. Recognize minimal circuit requirements.
 - 3. Employ Ohm's Law and power calculations involving basic electrical circuits.
 - 4. Construct and compare various circuit configurations.
 - 5. Compare the various types of electrical drawings and their uses.
 - 6. Discuss the role various components play in industrial electrical control systems.
- B. General Education Learning Outcomes (GELOs)
 - 1. GELO #5: Analytical, Quantitative, and Scientific Reasoning
Outcome 1: Apply mathematical and scientific methods to solve problems from an array of contexts and everyday situations.

IV. CONTENT/TOPICAL OUTLINE (*course outline may provide more detailed information*)

- A. Basic Electrical Concepts
 - 1. Introduction, components, quantities, and units
 - 2. Basic electricity, voltage, current, resistance
 - 3. Ohm's Law, energy and power
- B. Circuit Configurations
 - 1. Series circuits
 - 2. Parallel circuits
 - 3. Combination circuits
 - 4. Ohm's Law in series/parallel circuits
- C. Magnetism and Electromagnetism
 - 1. Principles of magnetic materials

- 2. Permanent and electromagnets
- 3. Relays and Relay Circuits (Start/Stop, Motor Starter)
- D. Capacitors and Inductors in DC circuits
 - 1. Principles and applications of capacitors in DC circuits
 - 2. Principles and applications of inductors in DC circuits
- E. AC circuits
 - 1. Sinewaves
 - 2. RMS, PEAK, PEAK-TO-PEAK and average values
 - 3. Transformers
 - 4. Power Supplies
 - a. Diodes
 - b. Rectification

V. INSTRUCTIONAL MATERIALS

- A. Required Text(s): Herman, *Electrical Studies for Trades*, (current edition – see instructor)
- B. Other Resources:
 - 1. Supplemental handouts supplied by instructor
 - 2. Scientific calculator
 - 3. Arduino Kit

VI. METHODS OF PRESENTATION/INSTRUCTION

- A. Methods of presentation typically include a combination of the following:
 - 1. Lecture
 - 2. Lab
 - 3. Group discussion
 - 4. Video presentation
 - 5. Demonstrations

VII. METHODS OF EVALUATION (*course outline will provide more detailed information*)

- A. Methods of evaluation, although determined by the individual instructor, traditionally includes a combination of the following:
 - 1. Homework
 - 2. Quizzes
 - 3. Group Projects
 - 4. Exams
 - 5. Lab Projects

VIII. SPECIFIC COURSE REQUIREMENTS:

- A. Completion of all tests, projects, assignments, and notebook (if required).
- B. Must earn a final grade of 70% (2.0) or higher.
- C. Program shop safety rules will be followed. **Please see the course outline for any additional safety rules established by the instructor.**