

SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Electrical/Electromechanical Technology Program
Date: August 2025

I. CATALOG DESCRIPTION

Course Number: ELEC2566
Course Title: Industrial Controllers and Processes
Prerequisite(s): ELEC1217
Catalog Description: This course focuses on industrial control devices such as variable Frequency drives and servo motors/drives. Industrial processes, including motion control, PID tuning, and vision systems are introduced and demonstrated in vocational lab.
Credit Hours: 3
Class Hours: 22.5
Lab Hours: 67.5
Total Contact Hours: 90

II. COURSE OBJECTIVES: *Course will:*

- A. Describe the applications and tuning of Process Control systems.
- B. Explain the set up and operation of electronic motor controllers.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Tune a process control application.
 - 2. Graph and analyze data from a process control system.
 - 3. Setup and test the operation of a Variable Frequency motor drive.
 - 4. Setup and test the operation of a Servo system.
- B. General Education Learning Outcomes (GELOs)
 - 1. GELO #3: Critical Thinking & Problem Solving
Outcome 1: Collect, identify, interpret and analyze data.

IV. CONTENT/TOPICAL OUTLINE

- B. PROCESS CONTROL
 - 1. Goal Statement: The student will perform the tuning of a PID process control system using the Zigler Nickols method.
 - a. Manual Control
 - b. Automatic control
 - 1. On/off control systems
 - 2. PID control systems
 - 3. Fuzzy control systems
- C. VARIABLE SPEED DRIVES
 - 1. Goal Statement: The student will perform installation and setup of AC and DC motor drives.
 - a. Variable frequency AC drives
 - 1. Describe the theory of operation of variable frequency AC drives.
 - 2. Discuss the components that are used in variable frequency AC drives.
 - 3. Discuss the uses of variable frequency AC drives.

4. Discuss the detrimental effects that variable frequency AC drive have on motors, and the things that are done to combat these effects.
 5. Learn the setup procedures to perform a basic installation.
 - b. DC motors and variable speed DC motor drives
 1. Describe the theory of operation of DC motors.
 2. Describe the different configurations of DC motors.
 3. Describe the theory of operation of DC drives.
 4. Discuss the components that are used in DC drives.
 5. Learn the setup procedures to perform a basic installation.
 - D. INTRODUCTION TO VISION SYSTEMS
 1. Goal Statement: The student will learn the basic uses and theory of operation of industrial Vision Systems.
 - a. Automated Visual inspection
 1. Describe the theory of operation of a CCD.
 2. Discuss picture resolution and its effects on picture quality.
 3. Discuss lensing and lighting.
 - E. ELECTRONIC SAFETY DEVICES
 1. Safety Guarding
 2. Describe basic machine guarding principals.
 3. Discuss Light curtain operation.
 4. Discuss Laser Perimeter Guard operation.
- V. INSTRUCTIONAL MATERIALS**
- A. Required Text(s):
 - B. Other Resources: Tools
 - C. Supplies: none
- VI. METHODS OF PRESENTATION/INSTRUCTION**
- A. Methods of presentation typically include a combination of the following:
 1. Lecture
 2. Lab
- VII. METHODS OF EVALUATION**
- A. Methods of evaluation, although determined by the individual instructor, traditionally includes a combination of the following:
 1. Overall course grade shall consist of Theory grade and Lab grade.
- VIII. SPECIFIC COURSE REQUIREMENTS**
- A. A minimum grade of 60% is required.
 - B. Cheating within the Manufacturing Division: Any violation of academic integrity on assignments, quizzes, or tests will result in a grade of 0 on that assignment, quiz, or test. A second violation in any course after the initial infraction will result in a grade of F for that course. Any additional violations while in the program will result in a suspension from the program.
 - C. Credit by Examination: Credit for the course CANNOT be earned through Credit by Examination.