

**SOUTHEAST COMMUNITY COLLEGE**  
**CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION**  
**Electronic Systems Technology Program**  
**Revision Date: August 23, 2021**

**I. CATALOG DESCRIPTION**

Course Number: ELEC2883  
Course Title: Robotics and Vision Systems  
Prerequisite(s): None  
Catalog Description: Lecture and lab projects featuring an in-depth study of industrial robotic systems and Smart-Image sensor technology programming and interfacing in automation systems.  
Credit Hours: 2.5  
Class Hours: 23  
Lab Hours: 45  
Total Contact Hours: 68

**II. COURSE OBJECTIVES:** *Course will:*

- A. Demonstrate how to program and to operate industrial systems including robotics and vision systems.
- B. Demonstrate how to effectively integrate robotics and vision systems with devices such as programmable logic controllers to create and troubleshoot a typical automation system.
- C. Explain the safety issues involving industrial automation systems.

**III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:**

- A. Student Learning Outcomes: *Student will be able to:*
  - 1. Explain robotics concepts and usage in an industrial environment.
  - 2. Demonstrate the application of and programming techniques for robotic automation.
  - 3. State robotic types and configurations.
  - 4. Perform robotic programming to perform a specific task
  - 5. Illustrate proper safety practices and procedures related to robotic systems
  - 6. Use a specific vision system for part recognition
  - 7. Assess the requirements for an automation system and build it
  - 8. Illustrate and perform the interfacing of robotics with vision systems and PLC's
- B. General Education Learning Outcomes (GELOs)
  - 1. GELO #3: Critical Thinking & Problem Solving  
Outcome 2: Synthesize information to arrive at reasoned solutions to problems.

**IV. CONTENT/TOPICAL OUTLINE**

- A. Introduction to Robots
  - 1. Robot Types and Applications
  - 2. General Configurations
  - 3. Troubleshooting using error codes, and LEDs on boards
  - 4. How to look up Error code
  - 5. Troubleshooting wiring up external equipment
  - 6. Safety
- B. Classifying robots
  - 1. Arm Configurations
  - 2. Controller and Power Supply

3. Work Performed
- C. End-of-Arm Tooling
  1. Grippers
  2. Special Purpose Effecters
- D. Robot Operating Systems and Programming Techniques
  1. Robot Operating Systems
  2. Languages
  3. Tech Pendants
  4. Simulation Software
- E. Robot Motion and Frames
  1. Linear
  2. Joint
  3. Circular (Arc)
  4. Offsets
  5. Frames
  6. Jogging
- F. Vision Systems
  1. Hardware and Vision Fundamentals
  2. Positioning softsensors
  3. Blob softsensors
  4. Math and measurement tools
  5. Emulator
  6. Object find softsensors
  7. Template match softsensors
  8. Lighting and optics
  9. OCR softsensors
  10. 1D and 2D Readers

## V. INSTRUCTIONAL MATERIALS

- A. Required Text(s): To be determined
- B. Supplies: 3-Ring notebook

**Commented [CAK1]:** Have we determined the new text or will there be none required?

## VI. METHODS OF PRESENTATION/INSTRUCTION

- A. Methods of presentation typically include a combination of the following:
  1. Technology enhanced lecture
  2. Classroom discussion
  3. Interactive group activities
  4. Audio visual materials
  5. Presentation by experts for the Electronics and Networking industry

## VII. METHODS OF EVALUATION

- A. Methods of evaluation, although determined by the individual instructor, traditionally includes a combination of the following:
  1. Attendance and participation
  2. Daily assignments
  3. Written exams and/or quizzes
  4. Performance and observational assessment

## VIII. SPECIFIC COURSE REQUIREMENTS

- A. A minimum grade of D is required.

- B.** Credit by Examination: Credit for the course CANNOT be earned through Credit by Examination.