

**SOUTHEAST COMMUNITY COLLEGE**  
**CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION**  
**Precision Machining & Automation Technology Program**  
**Revision Date: August 21, 2023**

**I. CATALOG DESCRIPTION**

Course Number: MACH1121  
Course Title: Machining Fundamentals  
Prerequisite(s): None  
Catalog Description: Theory and safe operation of machine and hand tools. Covers metrology, five basic machining techniques (drilling, turning, boring, milling, and grinding), tool geometry, speeds, feeds, and cutting fluids.  
Credit Hours: 2.0  
Class Hours: 23  
Lab Hours: 23  
Total Contact Hours: 46

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

- A. Discuss the types of machine shops and different careers available.
- B. Instill the importance and need for safety.
- C. Demonstrate the proper use and care of precision tools, hand tools, and machine tools.
- D. Teach the application of linear and angular measurement.
- E. Recommend proper calculations of cutter speeds and feeds.
- F. Explain screw thread terminology.
- G. Review theory of nontraditional machining processes and manufacturing systems.

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

- A. Student Learning Outcomes: *Student will be able to:*
  - 1. Identify careers and types of shops.
  - 2. Understand proper safety techniques and identify safety signage.
  - 3. Read and understand proper use and care of precision tools.
  - 4. Identify tool angles and grinding procedures.
  - 5. Identify cutoff and contour sawing machines.
  - 6. Identify drill bit features and drilling processes.
  - 7. Identify vertical milling machine features and milling processes.
  - 8. Identify features of a lathe and turning and boring processes.
  - 9. Identify threads and thread terminology.
  - 10. Understand basic Numerical control (NC, CNC, DNC) concepts.
  - 11. Understand nontraditional machining techniques.
- 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** (*course outline may provide more detailed information*)

- A. Unit 1
  - 1. History, Work Skills, Safety
  - 2. Hand Tools
  - 3. Measurement
  - 4. Sawing, Band Machining, Cutting Fluids
  - 5. Layout
  - 6. Drills & Drilling Machines

- B. Unit II
  - 1. Milling Machine & Milling Machine Operations
  - 2. Precision Grinding
  - 3. Jigs & Fixtures
- C. Unit III
  - 1. Lathe & Lathe Operations
  - 2. Tapers
  - 3. Fasteners and Threading
- D. Unit IV
  - 1. Introduction to CNC
  - 2. Electromachining
  - 3. Nontraditional Machining Processes

**V. INSTRUCTIONAL MATERIALS**

- A. Required Text(s): Hopewell, Eric and Hoffman, Peter; *Precision Machining Technology* (Refer to the CID or instructor for current edition)
- B. Other Resources: Notebook, Calculator

**VI. METHODS OF PRESENTATION/INSTRUCTION**

- A. Methods of presentation typically include a combination of the following:
  - 1. Lecture
  - 2. Small and large group discussion
  - 3. Video presentation
  - 4. On-line aids
  - 5. Demonstrations
  - 6. Handouts
  - 7. Observations
  - 8. Assigned lab projects
  - 9. Field trips

**VII. METHODS OF EVALUATION**

- A. Methods of evaluations, although determined by the individual instructor, traditionally includes a combination of the following:
  - 1. Workbook
  - 2. Quizzes
  - 3. Tests
  - 4. Participation/class conduct

**VIII. SPECIFIC COURSE REQUIREMENTS**

- A. Completion of all tests, projects, and assignments within the time allotted.
- B. Program shop safety rules will be followed. Please see the course outline for any additional safety rules established by the instructor.