

SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Precision Machining & Automation Technology Program
Revision Date: August 22, 2022

I. CATALOG DESCRIPTION

Course Number: MACH1349
Course Title: CNC I
Prerequisite(s): MACH1226; MATH1020 or higher, EXCLUDING MATH1040
Catalog Description: Basic theory and laboratory work in elementary programming, operation calculations and maintenance of Haas CNC milling machine. Operation and maintenance of Coordinate Measuring Machines (C.M.M.).
Credit Hours: 4.0
Class Hours: 45
Lab Hours: 45
Total Contact Hours: 90

II. COURSE OBJECTIVES: *Course will:*

- A. Introduce the basic fundamentals of G code programming for milling machines.
- B. Discuss the difference between absolute and incremental programming.
- C. Associate the trigonometry, geometry and algebra that applies to precision CNC.
- D. Demonstrate the methods used to organize and plan the steps needed to produce a workable G code program for a CNC milling machine.
- E. Describe the use of the Coordinate Measuring (CMM) to check the accuracy of the produced part.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Produce a two dimensional (X, Y) programmed part using “G” codes with both incremental and absolute coordinates.
 - 2. Align and measure a sample part using the CMM.
 - 3. Organize and plan the efficient programming of a part.
 - 4. Produce a workable shop drawing by reverse engineering a part program.
- 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. Trigonometry, Geometry, Algebra
 - 1. Basic right angle trigonometry with applied trigonometry/geometry assignments
 - 2. Oblique trigonometry/algebra assignments
- B. Coordinate Measuring Machine (CMM)
 - 1. Basics of CMM with lab worksheets throughout the course
- C. CNC history and evolution
 - 1. The design of automated machining
- D. Computer Numerical Control
 - 1. Writing an alpha/numerical program
 - 2. Set-up of the CNC machine
 - 3. Running a CNC program
- E. Reverse Engineering a CNC program

V. INSTRUCTIONAL MATERIALS

- A. Required Text(s): None
- B. Supplies: Notebook, Calculator, and USB memory stick

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. Demonstrations
 - 5. On-line aids
 - 6. Handouts
 - 7. Observations
 - 8. Assigned lab projects

VII. METHODS OF EVALUATION

- A. Methods of evaluations, although determined by the individual instructor, traditionally includes a combination of the following:
 - 1. Quizzes-Weighted percentage of grade
 - 2. Worksheets-Weighted percentage of grade
 - 3. Projects-Weighted percentage of grade
 - 4. Participation Policy: Punctual and regular attendance is required. Any class/lab session missed, regardless of cause, reduces the opportunity for the learning and can affect the grade received. For these reasons, attendance for the class/lab is imperative.

VIII. SPECIFIC COURSE REQUIREMENTS

- A. A grade of incomplete is only considered for students who have completed at least 80% of the course work, are currently receiving a passing grade, and under exceptional circumstances. Incompletes are at the instructor's discretion and must be negotiated prior to the end of the term and completed within the following term. Incompletes must have program chair/dean approval.