

Course Number: MACH 070A

Hours: 2 hours lecture, 3 hours laboratory

Course Description: Beginning Computer Numerical Control (CNC) programming covering programming concepts, Cartesian coordinate systems, geometric principles, and hands on programming.

**Rationale:**

Course Number: Course number will be from A-Z due to manufacturing technology standards changing, the National Metal Working Standards (NIMS) recommend that upgrade training be implemented on a three-year basis.

Hours: To fulfill the curriculum requirement for a three-unit class.

Course Description: Rewriting the course description to reflect the latest changes in technology.

Curriculum Approved: 2/00

San Bernardino Valley College

Course Outline for MACH 070A  
Computer Numerical Control Machining I

I. CATALOG DESCRIPTION:

Department: Machine Trades

MACH 070A: Computer Numerical Control Machining I

2 hours lecture, 3 hours laboratory = 3 units

**Catalog Description:** Beginning Computer Numerical Control (CNC) programming covering programming concepts, Cartesian coordinate systems, geometric principles, and hands on programming.

**Schedule Description:** Beginning Computer Numerical Control (CNC) programming covering programming concepts, Cartesian coordinate systems, geometric principles, and hands on programming.

Prerequisite/Corequisite: None

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of the course, students will be able to:

- A. Identify the basic concepts required in CNC programming.
- B. Identify CNC programming vocabulary and commands.
- C. Identify the Cartesian Coordinates System.
- D. Solve trigonometry problems relevant to CNC programming.

IV. CONTENT:

- A. Safety Overview
  1. General safety
  2. Identify shop hazards
  3. OSHA (Occupational Safety Health Act)
- B. Programming Overview
  1. Principles of computerized numerical control
  2. Types of CNC programs
    - a. Mills
    - b. Lathes
- C. Programming Basics
  1. Coordinate systems
  2. Geometric principles
  3. Trigonometry relevant to CNC programming
  4. Basic CNC programs for mills and lathes
- D. Locate Relevant, Current Research Materials
  1. Create a comprehensive course notebook
  2. Identify several sources of information available on a given subject

V. METHODS OF INSTRUCTION:

Methods of instruction may vary from instructor to instructor but may include:

- A. Lecture, Individual Consultation and Demonstration
- B. Hands-on Activities
- C. Reading

VI. TYPICAL ASSIGNMENTS:

- A. Research coordinate systems, absolute and incremental programming from Math for Part Programmers. Program a part utilizing absolute and incremental dimensioning.
- B. Using the polar coordinate system, write a part program utilizing angles and radius to identify the tool location.
- C. Using the geometric principles, calculate the dimensions utilizing  
$$\text{SIN}(\theta) = \frac{\text{side opposite}}{\text{hypotenuse}}$$
- D. Demonstrate the use of the T1-30X calculator by inputting the required angle of 30 degrees and determine the size of known angle.

VII. EVALUATION(S):

- A. Methods of evaluation may vary from instructor to instructor but may include:
  - 1. Written exercises and one project (comprehensive course notebook)
  - 2. Exams

Typical Questions:

- a. Refer to the points plotted on the illustrated Cartesian coordinate plane and determine the values of the corresponding X and Y locations in absolute and incremental coordinate.
- b. Write programs from drawings supplied for mill and lathe.
- c. Solve the following problem using a scientific calculator:

$$\text{Average chip thickness} = \frac{\sqrt{\text{width of cut}}}{D \times \text{IPT}}$$

- B. Frequency of evaluation may vary from instructor to instructor but may include:
  - 1. Eighteen exercises
  - 2. Three exams
  - 3. One final exam
  - 4. One project/comprehensive course notebook

VIII. TYPICAL TEXT(S):

Math for Part Programmers. Ellison Machinery Company, 1997.

Hoffman. Student Shop Reference Handbook. Industrial Press, 1998.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Texas Instruments T1-30X calculator