**SYLLABUS**

**DIVISION:** Business and Engineering Technology **REVISED:** Fall 2013

**CURRICULA IN WHICH COURSE IS TAUGHT:** Precision Machining Technology

**COURSE NUMBER AND TITLE:** MAC 122 – Numerical Control II

**CREDIT HOURS:** 2 **HOURS/WK LEC:** 1 **HOURS/WK LAB:** 2 **LEC/LAB COMB:** 3

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## I. CATALOG DESCRIPTION:

- Focuses on numerical control techniques in metal forming and machine processes.
- Includes theory and practice in milling machine computer numerical control program writing, setup, and operation.

## II. RELATIONSHIP OF THE COURSE TO CURRICULA OBJECTIVES:

- This course is intended to develop a basic knowledge of milling numerical control systems, operations, and capabilities.

## III. REQUIRED BACKGROUND/PREREQUISITES:

- MAC 121, 127

## IV. COURSE CONTENT:

1. CNC Milling Machine
    a. Safety
    b. Coordinate System
    c. Absolute and Incremental Distances
    d. HAAS Controller
    e. Machine Operation
    f. Work-piece Set-ups
    g. Tooling
    h. Tool Length and Work Offsets

2. CNC Mill Programming
    a. G and M codes
    b. Linear Interpolation
    c. Circular Interpolation
    d. Cutter Compensation
    e. Circular Pocket Milling
    f. Canned Cycles
        i. Drill Routines
        ii. Tapping Routines
        iii. Bolt Hole Patterns
        iv. Bore Cycles
    g. Loops and Sub-programs
    h. General Purpose Pocket Milling
    i. Thread Milling/Helical Milling

j. Text Engraving
k. Scaling
l. Rotation
m. Mirror Image

## V. THE FOLLOWING GENERAL EDUCATION OBJECTIVES WILL BE ADDRESSED IN THIS COURSE (Place X by all that apply)

__X__ Communications

_____ Personal Development

__X__ Critical Thinking

__X__ Quantitative Reasoning

_____ Cultural & Social Understanding

_____ Scientific Reasoning

__X__ Information Literacy

## VI. LEARNER OUTCOMES

## VII. EVALUATION

| **Learner outcome** | **Evaluation method** |
|---|---|
| • Shall understand the Cartesian coordinate system using absolute and incremental locations. | Lab exercises<br>In class assignments<br>Written tests |
| **Learner outcome**<br>• Demonstrate ability to safely setup and operate the CNC milling machine | **Evaluation method**<br>Lab exercises |
| **Learner outcome**<br>• Shall interpret and write CNC programs using “G” and “M” codes. | **Evaluation method**<br>Lab exercises<br>In class assignments<br>Written tests |
| **Learner outcome**<br>• Demonstrate the knowledge to properly set Tool Length offsets and work offsets on the CNC milling machine. | **Evaluation method**<br>Lab exercises |
| **Learner outcome**<br>• Demonstrate the knowledge to utilize cutter compensation, circular interpolation, canned cycles, drill routines, loops and sub-programs. | **Evaluation method**<br>Lab exercises<br>In class assignments<br>Written tests |
| **Learner outcome**<br>• Demonstrate the knowledge to program G and M code using sub-programs and “do” loops, mirror imaging, scaling, coordinate rotation, engraving, and helical milling. | **Evaluation method**<br>Lab exercises<br>In class assignments<br>Written tests |

## VIII. Over 90% of students will successfully complete this class.