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

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 In class assignments Written tests
• Demonstrate ability to safely setup and operate the CNC milling machine	Lab exercises
• Shall interpret and write CNC programs using "G" and "M" codes.	Lab exercises In class assignments Written tests
• Demonstrate the knowledge to properly set Tool Length offsets and work offsets on the CNC milling machine.	Lab exercises
• Demonstrate the knowledge to utilize cutter compensation, circular interpolation, canned cycles, drill routines, loops and sub-programs.	Lab exercises In class assignments Written tests
• Demonstrate the knowledge to program G and M code using sub-programs and "do" loops, mirror imaging, scaling, coordinate rotation, engraving, and helical milling.	Lab exercises In class assignments Written tests

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