SYLLABUS

DIVISION: Business and Engineering Technology **REVISED:** Spring 2014

CURRICULA IN WHICH COURSE IS TAUGHT: Precision Machining Technology

COURSE NUMBER AND TITLE: MAC 123 – Numerical Control III

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 lathe and milling machine computer numerical control program writing, setup, and operation.

II. RELATIONSHIP OF THE COURSE TO CURRICULA OBJECTIVES:

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

III. REQUIRED BACKGROUND/PREREQUISITES:

- MAC 122, MAC 222

IV. COURSE CONTENT:

A. Three axis Cartesian coordinate system

1. Absolute and incremental programming
2. 4^{th} and 5^{th} Axes

B. CNC Milling Machine

1. Safety and operation
2. Precision setups
3. 4^{th} and 5^{th} axes setups
4. Tool selection
5. Tool pre-setting

C. CNC Programming

1. Sub-programming and “do” loops
2. Mirror imaging
3. Scaling
4. Coordinate rotation
5. Datum shifts
6. Polar coordinates
7. Multiple work-offsets
8. Helical and thread milling
9. 4- and 5-axis programming

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 • Shall understand the Cartesian coordinate system using absolute and incremental distances and how to incorporate 4th and 5th axes.	**Evaluation method** Lab exercises In class assignments Written tests
Learner outcome • Demonstrate ability to safely setup and operate the CNC milling machine and tooling using 3, 4, or 5 axes and multiple work offsets.	**Evaluation method** Lab exercises
Learner outcome • Demonstrate ability to perform tool pre-sets using CNC tool pre-setter and transfer data to CNC milling machines.	**Evaluation method** Lab exercises In class assignments Written tests
Learner outcome • Demonstrate the knowledge to program G and M code using sub-programs and “do” loops, mirror imaging, scaling, coordinate rotation, polar coordinates and datum shifts.	**Evaluation method** Lab exercises In class assignments Written tests
Learner outcome • Demonstrate the knowledge to program G and M code using multiple work offsets, helical and thread milling, and 3-, 4-, and 5-axis programming.	**Evaluation method** Lab exercises In class assignments Written tests

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