A. COURSE DESCRIPTION

Credits: 4
Lecture Hours/Week: 1
Lab Hours/Week: 6
OJT Hours/Week: *.*

Prerequisites:
This course requires all 13 of these prerequisite categories
1. MACH 1601 - Introduction to Precision Machining
   And
2. MACH 1610 - Precision Measuring and Gauging
   And
3. MACH 1615 - Precision Machining Processes
   And
4. MACH 1625 - Engineering Drawings 2
   And
5. MACH 1630 - Introduction to CNC Theory
   And
6. MACH 1642 - CNC Operations 1
   And
7. MACH 1643 - CNC Operations 2
   And
8. MACH 1650 - Introduction to EDM
   And
9. MACH 2633 - CNC Precision Machining Mill
   And
10. MACH 2635 - CNC Precision Machining Lathe
    And
11. MACH 2637 - CAM Programming and Toolmaking Application I
    And
12. One of these two
    MACH 1605 - Engineering Drawings 1
    CMAE 1510 - Print Reading
    And
13. One of these two
    MACH 1661 - Introduction to CAD/CAM
    MACH 1662 - Introduction to CAD/CAM + 3D Printing

Corequisites: None
MnTC Goals: None

This course will focus on CNC machining using all computer numerical control machines available in the shop, including electrical discharge machines, mills, and lathes. Presentation & lecture time will discuss jig & fixture theory, and methods of writing CNC programs. The student will be responsible for the programming, set-up and safe operation of all machines. Projects will be assigned by the instructor for each type of machining. (Prerequisites: MACH1601, MACH1605, MACH1610, MACH1615, MACH1625, MACH1630, MACH1641, MACH1650, MACH1661 or equivalent) (4 Credits: 1 lecture/3 lab)

B. COURSE EFFECTIVE DATES: 01/27/2016 - Present
C. OUTLINE OF MAJOR CONTENT AREAS
   1. Safety considerations in CNC set-up & operations
   2. Learning G & M code programming language
   3. Fixture design for CNC mill application
   4. 3-D surface machining in a CNC mill
   5. Math calculations related to feed & speed selection for tooling
   6. Develop 5-S program skills

D. LEARNING OUTCOMES (General)
   1. Identify safety rules
   2. Wear proper eye protection
   3. Wear proper safety attire
   4. Presentation and lecture will discuss jig and fixture theory
   5. Use CAD system to design projects
   6. Design and build tooling fixtures and drill jigs
   7. Demonstrate proper tool set-up and off-set data entry on CNC mill
   8. Demonstrate knowledge of insert selection data for mill cutters
   9. Demonstrate knowledge of speed and feed selection related to part materials
   10. Operate computer aided machine tools safely by performing a block-step program check
   11. Use precision measuring tools
   12. Use EDM machining where appropriate
   13. Run sample part
   14. Complete inspection of part
   15. Clean all machines (5-S program)
   16. Lubricate machine tools (5-S program)

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies
   None

F. LEARNER OUTCOMES ASSESSMENT
   As noted on course syllabus

G. SPECIAL INFORMATION
   None noted