CNC II
Course Outcome Summary

Course Information
Organization: Monroe County Community College, Applied Science and Engineering Technology
Developers: Bob Leonard
Development Date: 9/9/2009
Course Number: MECH 104
Instructional Level: Associate Degree
Potential Hours of Instruction: 60
Total Credits: 3

Description
This course covers the theory, use and process of Computer Numerical Control (CNC) and advanced machine tool techniques. Instructor will reference the Machinery's Handbook for assignments regarding form, fit, clearance, rpm, feedrates, thread nomenclature and more. Detailed coverage of plastic molds, composites and high strength materials. Cutter material and optimizing process time is covered. G and M code, manual programming, operation and editing of the CNC Mill Machining center, CNC Lathe and CNC electric discharge wire machine, (EDWM) are included in the lab experience. Lab will include two dimensional part programs created and analyzed for their program efficiency, part set up, tool life, time optimization, quality and safety constraints. Dies, presswork, cutter compensation, tool length offset, set up systems, standard and metric screw nomenclature and grinding are also covered. Lean Manufacturing principles, composites and plastics are covered. Vocabulary and safety are stressed.

Major Units
Numbering and Coding
CNC Machine Parameters
Coordinate and Positioning Systems
Programming Methods
Process Planning and LEAN Manufacturing Principals
G and M Codes
CNC Tooling & Work-holding
CNC Mathematics Cutter Comp. and Offsets
Editing for Mill and Lathe CNC
Metallurgy and Composites
CNC for Mold Dies and Wire EDM

Types of Instruction

<table>
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<tr>
<th>Instruction Type</th>
<th>Contact Hours</th>
<th>Credits</th>
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<tr>
<td>Classroom Presentation</td>
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<tr>
<td>On-Campus Lab</td>
<td>60</td>
<td>3</td>
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<td>Credits</td>
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Textbooks
Richard A. Gizelbach. *CNC Machining.*

Learner Supplies
Calculator with trigonometry functions. **Quantity:** 1. **Source:** Bookstore.
Folder for handouts. **Quantity:** 1. **Price:** $1. **Source:** Bookstore.

Prerequisites
Mech 103

Exit Learning Outcomes
Program Outcomes
A. Demonstrate computer competency required for CAD-CAM
B. Demonstrate technical skills to program and operate CNC equipment
C. Demonstrate competencies in the operation and maintenance of automated and/or non automated equipment
D. Analyze and implement solutions to 2 and 3 Dimensional CAD-CAM & CNC programs
E. Demonstrate concepts and apply analytical problem solving methods
F. Demonstrate competency in applying LEAN principals
G. Identify links with process speeds and material to process times
H. Comply with safe operations of all machine tools and equipment

General Education Outcomes
A. Communicate information in writing using the rules of standard American English
B. Demonstrate an understanding of social science concepts
C. Demonstrate an understanding of the process of scientific inquiry
D. Apply mathematical approaches to the interpretation of numerical information
E. Communicate ideas in writing using the rules of standard American English
F. Apply mathematical approaches to the analysis of numerical information
G. Communicate information in writing using the rules of standard American English
H. Use computer technology to retrieve information
I. Use computer technology to communicate information
J. Apply mathematical approaches to the analysis of numerical information

External Standards

Competencies
1. Describe and demonstrate proper links to lathe, mill, grinding and tooling connected to the CNC.
2. Calculate proper feeds and speeds for any given material.
3. Identify safe set up procedures and tooling for CNC machining.
4. Define functions LEAN Manufacturing principles.
5. Demonstrate G & M code programming using linear, circular & pre programmed cycles.
6. Analyze and correct programming commands and their path to varied controllers.
7. Write, edit, upload, download and prove out a program for the CNC mill, lathe and wire EDM.
8. Solve basic CNC mathematical problems.
9. Create proper tools and fits for Manufacturing operations.