Virginia Western Community College
MEC 119
Introduction to Basic CNC and CAM

Prerequisites
MTE1, MTE 2, and MTE 3 or divisional approval.

Course Description
Teaches the basic concepts of Computer Numerical Control (CNC) programming of Numerical Control Machinery with emphasis on Computer Aided Manufacturing (CAM)/ Computer Aided Drafting (CAD). Program writing procedures will be based on using the following: basic G-code programming language for CNC machinery, CAD/CAM programming systems to produce correct code for CNC Machinery, basic computer usage, CAD/CAM integration, and Code-to-machine transfer via Distributive Numeric Control (DNC).

Semester Credits: 3   **Lecture Hours:** 2   **Lab/Recitation Hours:** 2

Required Materials

Textbook:

Introduction to Computer Numerical Control (CNC), 5th ed., Author: Valentino, Publisher: Pearson, ISBN: 9780132176033

Other Required Materials:

USB drive for data transfer and storage.
OSHA approved safety eyewear

The following supplementary materials are available:

Additional notes will be posted on Blackboard during the semester as reference material for various subjects to be covered in this course.

<u>**Course Outcomes**</u>

At the completion of this course, the student should be able to:

1. Make precision measurements and understand tolerances
2. Safely operate basic manual machine tools
3. Calculate and apply safe cutting feeds and speeds
4. Drill a hole at a specific location
5. Complete a project using milling machines and engine lathes
6. Understand the relationship between CAD and CAM
7. Understand CNC programming concepts including linear & arc moves, absolute & relative positioning
8. Create a CNC program by hand to write a simple part program
9. Setup and operate the DaVinci CNC engravers
10. Understand the application of CAM systems to the manufacturing process

<u>**Topical Description**</u>

Week	Materials to be covered:
1	Intro, Get Acquainted. Precision measurement using steel rules, calipers and micrometers. Safety review and operation of drill press.
2	Review of basic drafting and blueprint reading skills. How to read and specify tolerances. Create Process Sheets for Hammer project. Safety review and operation of horizontal saw.
3	Types of tooling and cutters. Types of materials. How is hardness specified.
4	Safety review and operation of engine lathe. Saw hammer project blanks.
5	Present formulae for cutting feeds and speeds. Face and center drill hammer handles.
6	Safety review and operation of vertical mill. Review for Test 1. Turn hammer handles.
7	Test 1
8	Turn hammer handles. Square hammer heads and mill to size.

VIRGINIA WESTERN COMMUNITY COLLEGE
School of Science, Technology, Engineering and Mathematics
(540)-857-7273

3097 Colonial Ave. SW
Roanoke, VA 24015

9	Thread specifications. Contour mill hammer heads. Thread hammer handles.
10	Contour mill hammer heads. Thread hammer handles.
11	Machining operations. Drill and counter bore hammer heads. Radius hammer handles.
12	CAD and CAM introduction. Basic G & M codes. Tap & file hammer heads. Knurl hammer handles.
13	Turn in Hammer Project. Design letters for engraving. Create absolute and incremental programs.
14	Add arcs to programs. Translate to G-code. Engrave letters on DaVinci CNC routers.
15	Complete DaVinci projects. Final Review.
16	Final Exam

Note: Course Outline is subject to change.

Notes to Instructors

- This course is taught at Roanoke County Schools Burton Center for the Arts and Technology campus. The computer labs are not on-line with those at VWCC. Students are not on the VWCC campus during these evening classes.

- The final project/exam is worth 15-20% of the final grade.