Course Information Form (CIF)

Course Code: MFT 138

Course Title: Intermediate CNC Programming - Milling

Department: Applied Sciences and Technologies
PCS Code: 1.2 - Occupational/Technical Instruction
CIP Code: 15.0499
Repeatability: 0

Effective Date: Summer 2026

Credit Hours

Catalog Notation: 4-0-4
Credit Hour Distribution:

Lecture: 4	Lab: 0	Clinical: 0	**Total: 4**

General Course Information

Catalog Description

Intermediate computer numerical control (CNC) three-axis programming and operation; CNC mill and lathe operation, and good programming practices.

General Course Objectives

Students will develop an understanding of introductory terms and conventions of Computer Numerical Control (CNC) three-axis milling machine programming and operation. Organizational and conceptual skills will be developed so students are able to create tooling requirements and tool path programming code from part drawings. Students will learn the proper sequence and procedure for the setup and operation of a CNC milling machine.

Minimum Placement Levels

English	Reading	Math
Placement into ENG 098	Placement into CCS 098	Placement into MAT 059

Prerequisites

Credit in MFT 137

Methods of Evaluation

The minimum evaluation methods include 2 (intermediate level) CNC programming exams - one turning, one milling; 8 CNC programming chapter exercises; 2 CNC programming projects; and 1 final CNC programming project.

Instructional Materials and Additional Supplies

MasterCAM software tutorials, online and textbook resources through Caminstructor.com

Course Content

General Learning Outcomes (GLOs)

- Reasoning and Inquiry: Students will demonstrate the ability to solve problems using deductive reasoning and logic, quantitative reasoning, or the scientific method.
- Technology: Students will demonstrate the ability to evaluate, select, and appropriately use current and emerging tools.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Overview of CNC Terms and Conventions from Prerequisite Course and Their Application to CNC milling: Absolute and Incremental Systems, Cartesian Coordinate System	1. Identify how certain prerequisite materials will be applied to CNC milling.	2	0	0
Three-axis Programming System, Axis Conventions; Machine Zero, Home Zero, and Program Zero	1. Apply the three-axis programming system to CNC turning and milling. 2. Differentiate and apply the concepts of the various types of zeros used.	6	0	0
Manual Operation of CNC Milling Machine and Lathe, General Principles, and Concepts	1. Describe how to manually operate the CNC milling machine and lathe. 2. Identify basic machine commands. 3. Identify machine movement in terms of the Cartesian coordinate system.	6	0	0
Programming Tool Path Motion Using MasterCam Software Standards for Milling and Turning; Rapid, Linear, and Circular Interpolation	1. Describe the function of G and M codes. 2. Develop basic programming skills for CNC milling and turning. 3. Program linear and circular interpolation moves.	12	0	0
Controlling Spindle and Coolant Functions, RPM, Feed Rates, and Chip Loads	1. Control the spindle and coolant functions of the CNC milling machine. 2. Select the proper feed rates and RPM for a variety of situations.	6	0	0
Tool Changing, Tool Length Offsets, and Modal Commands	1. Describe tool changing functions. 2. Explain the effects of tool length offsets and modal commands, and their effect on programming for a CNC milling machine and lathe.	6	0	0
One Shot G Codes; Canned Cycles for Turning, Milling, Drilling and Reaming	1. Describe the effects of one shot G codes. 2. Select and apply the use of various canned program cycles for turning, threading, milling, drilling, and reaming on a CNC machine.	5	0	0
Bolt Circle Cycles, Tapping, and Boring	1. Prepare and program code for executing bolt circle, tapping, and boring operations on the CNC milling machine.	5	0	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Contour and Profile Milling, Cutter Radius Compensation	1. Explain the effectiveness of profile and contour milling methods. 2. Apply cutter radius compensation. 3. Tool nose radius compensation to accurately produce part print geometry.	6	0	0
Conditional Switches and Machine Setup	1. Assess the need for various types of conditional switching functions. 2. Prepare the CNC milling machine and lathe for setup, operation, and execution of programs.	6	0	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
60	0	0