



Mid Michigan Community College M-TECsm

CNC Programmer

(Computer Numerical Control)

Co-requisite: Math 104 or higher.

CNC Programmer/Operator: Once completed, the M-TEC's CNC Programmer has both CNC machine operator skills and CNC programming skills. A CNC operator has competency in mill and lathe machines using G and M codes to calculate programs, along with the ability to edit and make recommendations to engineering. An operator will set fixtures and tools. The operator is responsible for production runs of manufactured components and the measurement of the product must conform to customer specifications. The CNC programmer has the ability to: create CNC programs using G and M codes and enters them into CNC machines, edit and troubleshoot CNC programming, has good blueprint reading skills, and may often supervise other CNC operators. Skills learned in this course listed below in detail. Salary range can be \$14.00 - \$22.00 P/H depending on organization and geographic location.

The top number is for non-credit, the bottom number is for credit.

MNFG 2700 Manufacturing Print Reading Basics: This course will provide participation with hands-on introduction to the art of reading blueprints commonly used in the manufacturing industries. The curriculum starts from basic drawing office practices through simple component drawings and ends with complex system and structural drawings currently used in the manufacturing industries. (4 ClarityNet On-line Course Titles: PTR1, PTR2, PTR3, PTR4)

MNF 1700 for 3 credits

MNFG 5500 Geometric Dimension & Tolerance: Product engineering drawings are the primary means of communicating design requirements and true functional limits of acceptable part geometry. To ensure uniform interpretation of all drawings, each user must have a common understanding of all symbols on the drawing. This course focuses on the principles of geometric tolerance and how it complements conventional tolerance; stack up tolerances, Tolerance of Position (TOP) Controls, Concentricity and Symmetry Controls, Run out Controls, and Profile Controls. GD&T techniques are described according to the definition in the ASME Standards and through application examples in various drafting standards. Classroom exercises provide participants with opportunities to become conversant in the GD&T language by converting design requirements into symbol form and performing geometric tolerance calculations. This course is designed for a small team to work on an actual production or in-design product.

MNF 1900 for 2 credits DRF 105 Equivalent

MNFG 9300 Statistical Process Control: Statistical Process Control (SPC) is a method of monitoring, controlling and, ideally, improving a process through statistical analysis. Its four basic steps include measuring the process, eliminating variances in the process to make it consistent, monitoring the process, and improving the process to its best target value.

MNF 2000 for 2 credits

MNFG 1300 Intro to Metallurgy: Introduction to Metallurgy introduces the student to the properties and characteristics of metals. Students will gain a basic understanding of the latest industry processes that change the physical and mechanical properties of metals and materials processing techniques. This course utilizes both an on-line training format in the theory and concepts of metallurgy and a text book that examines the behavior and characteristics of metals and materials, and current practices for materials processing that is being used in industry today. Students will take a visual approach using video, graphics, drawings, and photographs to illustrate actual equipment, processes, and differences in metals when they are subjected to certain conditions such as heating, forming, or forging. Knowledge in metallurgy is needed when performing machine tool practices, welding applications, manufacturing applications, and any other application that uses metals and metal by-products. (On line - Metals in the Plant)

MNF 2140 for 3 credits

MNFG 5101 Basic Machine Shop Practices: This course is an introduction to machine tool operations and associated processes. Students will become familiar with milling machines, engine lathes, drill press, grinding machines and band saws. Knowledge of machining terminology and concepts such as speeds and feeds, tool geometry, blueprint interpretations as well as skill in the use of precision measuring tools will be developed. Includes Lessons: TPC 315 (1, 2, 3), TPC 316 (1, 2, 3, 4), TPC 317 (1, 3, 5), TPC 323 (3, 4, 5) TPC 324 (1, 2), TPC 325 (1, 2).

IND 101 for 4 credits (refer to MMCC schedule)

MNFG 5102 Machine Tool Practices II: This course expands on the principles learned in Basic Machine Shop Practices, including thread manufacturing, precision grinding, boring operations, and the ability to precisely place and inspect geometric features to determine product conformance is also covered. Includes Lessons: TPC 316 (5), TPC 317 (2, 4), TPC 323 (1, 2), TPC 324 (3, 4, 5), TPC 325 (3, 4, 5), TPC 326 (1, 2, 3, 4, 5) Prerequisite: MNFG 5101 or IND 101, grade of "C" or better in MAT 104 or equivalent.

IND 102 for 4 credits (refer to MMCC schedule)

MNFG 6500 Introduction to CNC Programming: This is a self-paced comprehensive training module in which the student will be introduced to CNC programming codes using the EMCO PC Mill 50 CNC machine and FANUC 0 software. This course will familiarize the student in learning G and M codes, translating print drawings into CNC programming codes, become familiar with general CNC principles and its functions. This is a pre-requisite to Intermediate CNC Programming. Training manual is included in this course.
MNF 2200 for 2 credits IND 113 Equivalent

MNFG 6501 Intermediate CNC Programming: Students will be introduced to the HAAS Model VF 1 Machine Center and its functions. Coursework will include textbook, supporting workbook, and supplemental video instruction in CNC operation. Students will gain sufficient knowledge in the structure and operation of the Haas and Mazak CNC machines. Students will perform a number of structured exercises until they become competent in the programming and operation of these machines. Final project will require the student to design their own machined part drawing with supporting documentation and tolerances to be inspected by the Subject Matter Expert before actual machining is to be done. *Pre-Requisite: Introduction to CNC Programming.*
MNF 2300 for 4 credits IND 116 Equivalent

MNFG 2400 CNC Machine Tool Practices: This course is designed to offer the student a complete breakdown of machine tool practices. Using the textbook in association with its project oriented workbook, students will gain knowledge in shop safety, hand tools, dimensional measurement and how to accurately use precision tools, understanding and identification of materials, layout practices, preparation for machining operations, sawing machines, drilling machines, turning machines, vertical milling machines, horizontal spindle milling machines, grinding processes, and computer numerical control processes.
MNF 1800 for 3 credits

****Note: This is the minimum curriculum required. You have the option to select the following (or any other) course(s) available to enhance your CNC skills and/or your employment opportunities:***

****Note: Any optional course(s) added to the above curriculum will result in an increase of tuition for the cost of selected optional course(s) and any book charges incurred.***

MNFG 2100 Fundamentals of Pneumatics: The course will familiarize the student with the theory, concepts and modes of operation of pneumatic components. This course is a systems approach to air logic circuit development and functionality. The course will cover symbols, theory and lab application.
MNF 1000 for 3 credits

MNFG 4200 Fundamentals of Hydraulics: The course covers the science that deals with the laws governing water or other liquids in motion and their applications in partial or applied technology. It will familiarize the student with the theory, concept and modes of operation of hydraulic components. This course is a systems approach to hydraulic circuit development and operation. The course will cover symbols, theory and lab application.
MNF 1200 for 3 credits

MNFG 5401 Basic Applications of Industrial Sensors: This course will introduce the students in the identification, application, and design of sensing technologies used in today's industry. This course offers instruction using fiber optic sensors, infrared sensors, proximity sensors, and limit switches. This is a comprehensive course that progresses the student through the identification of sensor components, their principles, applications, and functionality of these sensors by mean of theory and concept and hands-on lab applications. (On-line ClarityNet course titles: Sensor & Transducer Principles, Transmitters and Transducers.)
MNF 1500 for 2 credits

MNFG 2210 Basic Introduction to Robotics: The course will familiarize the student with the basic function and operation of the MICROBOT TeachMover II Robot and its axis of motion. Students will learn the basic principles of programming using the MICROBOT's teach pendant to program the robot to perform specified tasks to operate the pick and place robot, auxiliary turntable device, and numerous outputs. (On-line ClarityNet course titles: Time Delay Relays, Variable Speed AC Drivers and Servo Stepper Motors)
MNF 1600 for 2 credits

NOTE: Tuition rates are subject to change by approval of the MMCC Board of Trustees.

CNC Programmer (249 Hrs)

Manufacturing Blue Print Reading	\$ 707.00	Books: Prices are subject to change and applicable taxes apply.	
		Blueprint Reading	\$ 29.95
		Blueprint Reading for the Machine Trades	\$ 60.00
Geometric Dimension & Tolerance	\$ 458.00	Fund of Geometric Dimensioning & Tolerancing Wrkbk for VHS	\$ 42.95
Statistical Process Control	\$ 493.00	SPC Reference Guide, <i>SPC Workout and Advanced SPC</i>	\$ 10.40
Intro to Metallurgy	\$ 737.00	Practical Metallurgy & Materials of Industry 6/E	\$ 90.20
		1" Binder	\$ 3.29
Basic Machine Shop Practices	\$ 901.00	Lab Course Pack (See Ed VanAvery)	\$ -
		1 – 6" Steel Rule	\$ 8.99
		1 – Pair of Safety Glasses	\$ 3.49
Machine Tool Practices II	\$ 901.00	Lab Course Pack (See Ed VanAvery)	\$ -
		1 – Alum. Oscillating Steam Engine Kit	\$ 55.50
Introduction to CNC Programming	\$ 468.00	Intro to CNC Level I	\$ 15.50
Intermediate CNC Programming	\$ 926.00	Computer Numerical Control, Operation and Programming 3rd Edition, ISBN: 0-13-111547-2	\$ 110.00
CNC Machine Tool Practices	\$ 697.00	Machine Tool Practices	\$ 90.75
		Workbook for Machine Tool Practices	\$ 25.20
Tuition CNC Programmer	\$ 6,288.00	TI 30 or higher calculator	\$ 20.95
Books	\$ 567.17	Total	\$ 567.17
Total CNC Programmer	\$ 6,855.17		

Optional Courses

Hydraulics	\$ 782.00	Optional Courses Book Price:	
		Principles of Hydraulics MB400	\$ 82.00
Pneumatics	\$ 767.00	Principles of Pneumatics MB200	\$ 82.00
Industrial Sensors	\$ 488.00	Applications of Industrial Sensors MB600	\$ 82.00