

# EC3 CNC Operator/Programmer



**ERIE COUNTY**  
COMMUNITY COLLEGE OF PA

## Program Description

Erie County Community College's Industrial Manufacturing Technology Program prepares students for high-demand careers in operating and programming Computer Numeric Controlled (CNC) machines. Students gain the skills needed to succeed as a programmer in advanced manufacturing machine safety, blueprint reading, math, metrology, and proper part inspection methods as part of the production and planning process. Students learn the techniques, hardware, software menus and computer system practices associated with a Computer-Aided Machining/Distributed Numerical Control (CAM/DNC) system to manually write, save, retrieve, and transfer CNC machine tool programs.

## Program Learning Outcomes

Upon successful completion of this program, students will be able to:

- Describe and demonstrate shop safety practices
- Demonstrate proficiency with various tools and machines
- Identify and describe the purpose and function of precision measurement systems
- Identify and describe basic functions of precision measurement tools
- Describe the importance of precision in manufacturing
- Perform complex machine tool making activities commonly used in manufacturing
- Perform basic Computer Numerical Control (CNC) programming, set up and operations of CNC, conventional machine tools, precision tools and general tools.
- Demonstrate knowledge of print reading.
- Use mathematical knowledge to solve machining problems.
- Develop, document, and implement project plan for machining parts.

## Program Sequencing – 3 Semesters

FIRST SEMESTER		CREDITS
IMT 102	Industrial Manufacturing Tech I	3
IMT 104	Industrial Manufacturing Tech II	3
MAT 107	Technical Math	3
SECOND SEMESTER		
IMT 112	Metrology – the Study of Measurement with GD&T	3
IMT 200	Introduction to CNC Programming I	3
IMT 202	Introduction to CNC Programming II	3
THIRD SEMESTER		
IMT 204	Introduction to CNC Toolpath	3
IMT 206	Advanced CNC Programming	3
<b>Program Total</b>		<b>24</b>

## FALL 2022 Class Schedule

Section	Academic Period	Start Date	End Date	Locations	Meeting Patterns
IMT 102-8A1 - Industrial Manufacturing Technology I	2022 Fall - First 8 Weeks	8/22/2022	10/17/2022	Erie High School - Machining Room 181	Monday/Tuesday/Wednesday   5:15 PM - 9:00 PM
IMT 104-8B1 - Industrial Manufacturing Technology II	2022 Fall - Second 8 Weeks	10/20/2022	12/16/2022	Erie High School - Machining Room 181	Monday/Tuesday/Wednesday   5:15 PM - 9:00 PM
MAT 107-001 - Technical Math	2022 Fall - full 16 weeks	8/22/2022	12/16/2022	Erie High School - Machining Room 181	Thursday   6:00 PM - 8:45 PM

For more info, call: 814-413-7000 or visit: [www.ec3pa.org](http://www.ec3pa.org)

## **IMT 102 - Industrial Manufacturing Tech. I**

This course provides classroom and laboratory learning experiences related to fundamental machine tool technology by focusing on power saws, drill presses, basic lathes and related tooling. Course includes speed and feed calculation, part layout, basic measuring tools and related manufacturing theory. Safe work practices are strongly stressed. (Prerequisite: None)

## **IMT 104 - Industrial Manufacturing Tech. II**

This course is a continuation of IMT 102 beginning with engine lathes and introducing horizontal mills, vertical mills, and CNC basics. Course includes related information on tooling, speeds and feeds, measuring instruments and manufacturing theory. (Prerequisite: IMT 102 or instructor consent).

## **MAT 107 - Technical Math I**

The course emphasizes the mathematical knowledge needed to be successful in the workplace, including number systems, geometry, algebra, and trigonometry. Students will engage in problem-solving activities using real-world career examples that help students learn not only the needed mathematical skills, but also how those skills are used in specific fields of interest (Prerequisite: Grade of C or better in MAT 090, consent of instructor, or satisfaction of other placement criteria).

## **IMT 200 - Introduction to CNC Programming I**

A survey of the tools and theory regarding computer integrated manufacturing (CIM). CIM is the union of hardware and software, database management, and communications to automate and control production activities from planning and design to manufacturing and distribution. Introduces basic CNC lathe set up and operation. Includes safety, turning, grooving, drilling, boring, threading, and cutting tools. Programs are written, developed, simulated, run, and debugged on actual machine tools. (Prerequisite: (1) IMT 104; and (2) MAT 107; or (3) Consent of Instructor)

## **IMT 112 - Metrology-The Study of Measurement with GD&T**

Study of the proper use of modern precision measurement tools and the interpretation of the data obtained from their use. Topics include the use of traditional precision measurement tools such as micrometers and calipers, surface plate work, modern measurement tools such as laser micrometers, digital height gages and coordinate measuring machines to determine angular and linear dimensions. Measurements from these tools will determine the acceptability of machined parts as specified on geometric dimensioning and tolerancing (GD&T) prints. (Prerequisite: None)

## **IMT 202 - Introduction to CNC Programming II**

This course is a continuation of IMT 200, Introduction to CNC programming. The use of M & G code programming to produce CNC programs for machined parts will be taught. Specific areas of programming including linear and circular interpolation, canned cycles, drilling, reaming, tapping, boring, face milling, end milling and the use of sub programs will be covered. Setup and operation of CNC milling machine controls will be covered and used to proof run programs. (Prerequisite: IMT 200 or concurrent enrollment in IMT 200 or instructor consent)

## **IMT 204 - Introduction to CNC Toolpath**

The student will bring together knowledge of geometry generation using CAD and conventional CNC program generation to learn computer generated toolpathing. The student will generate geometry, initiate computer toolpaths and output executable CNC programs using CAD/MasterCam toolpathing software on personal computers. Additionally, post processor generation will be discussed. (Prerequisite: IMT 200 and IMT 202 or concurrent enrollment in IMT 202 or instructor consent)

## **IMT 206 - Advanced CNC Programming**

This course builds on the knowledge gained in the IMT 204 Introduction to CNC Toolpath course and expands the knowledge of design and production of CNC programming. Advanced programming are simulated off-line and run on multi-axis CNC machines Students apply advanced precision machining skills, complex setup, and programming advanced part geometry. Canned cycles, cutter compensation, subroutines, probing functions, and high-speed machining processes will be introduced. (Prerequisite: IMT 204 or instructor consent)



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