COURSE INFORMATION FORM

DISCIPLINE: CIMM

COURSE TITLE: CNC Lathe Operation Fundamentals

CR. HR.   4  LECT HR.  2.5  LAB HR.  3  CLIN/INTERN HR.  

CATALOG DESCRIPTION

The student will learn the fundamentals of Computer Numerical Control (CNC) lathe programming and operation. This course is designed for students in machining and manufacturing careers.

PREREQUISITES

CIMM 110 or concurrent enrollment

EXPECTED STUDENT OUTCOMES IN THE COURSE (ESO)

Upon completion of this course, the student will be able to:

1. Perform basic set up and safe operation of CNC lathes.
2. Describe linear and circular interpolation.
3. Describe radial and diametral programming.
4. Describe the Cartesian and polar coordinate systems.
5. Describe absolute and incremental positioning systems.
6. Interpret, load and prove out a CNC program.
7. Describe various canned cycles for CNC turning applications.
8. Navigate the machine control panel.
9. Power-up and home a CNC lathe.
10. Properly set the work offset or origin of the CNC lathe.
11. Identify and select appropriate tooling and workholding devices used for CNC turning.
12. Safely and properly setup tooling and cutting tools.
13. Set and properly adjust tooling offsets.
15. Properly load a workpiece for CNC turning.
16. Verify part dimensions to drawing specifications.
17. Define and explain tool nose radius compensation (TNRC) for CNC turning.
18. Define the work coordinate system (WCS) and the machine coordinate system (MCS) for CNC turning.
19. Describe tool geometry, tool wear, tool nose offsets and tool quadrant settings for TNRC.
20. Load a CNC turning program into the MCU.
21. Write a basic CNC turning program using G- and M-code.
22. Troubleshoot a CNC turning program.
23. Perform CNC lathe preventive maintenance.
GENERAL EDUCATION OUTCOMES (ESO)
Specify which general education outcomes, if any, are substantially addressed by the course. Numbers in parentheses identify the Expected Student Outcomes linked to the specific General Education Outcome.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>ESO</th>
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PROGRAM-LEVEL OUTCOMES

CAREER AND TECHNICAL EDUCATION PROGRAM OUTCOMES
Specify which Career and Technical program outcomes, if any, are substantially addressed by the course by completing the “Career and Technical Education template” to show the relationship between course and program outcomes to assessment measures.

1. Students will demonstrate the ability to apply foundational skills in an industrial setting, safely and to industry guidelines.
2. Students will think critically and apply problem-solving skills.
3. The program will graduate individuals who exhibit competence in CNC programming, setup and operation.

CLASS-LEVEL ASSESSMENT MEASURES –
Student accomplishment of expected student outcomes may be assessed using the following measures. (Identify which measures are used to assess which outcomes.)

1. Classroom discussion/Participation: (1 – 23)
2. Assignments/Labs: (1 – 23)
3. Written and Application Exam: (1 – 23)
COURSE OUTLINE FORM

DISCIPLINE  C IMM

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Individual instructors may order this outline as fits the needs of their individual courses. In addition, they may place more emphasis on some areas than on others. What is assured is that this particular list is covered in the course. Other topics may be added to a course as the instructor sees fit, and as time and interest allow. An *asterisk can be used to mark an item as optional.

I. Programming Fundamentals for Lathe
   A. Learning G and M codes
   B. Learning the structure of a CNC program
   C. Writing a program
   D. Loading a program

II. Machine Control Panel

III. Understanding canned cycles

IV. Learning Programming coordinate systems

V. Workholding Setup

VI. Machine and Work Coordinate Systems

VII. Power-up and Homing

VIII. Work Offset Setting
   A. X-axis
   B. Z-axis

IX. Cutting Tools for Turning
   A. Cutting tool installation
   B. Cutting tool offsets for Turning

X. Program Entry for Turning

XI. Turning Machine Operations
   A. Prove out
   B. Auto mode

XII. CNC Lathe Setup

XIII. Turning Machine Operation
   A. Programming
   B. Program prove out
   C. Auto mode

XIV. Operator Best Practices
   A. Part Loading
   B. Part inspection
   C. Offset adjustments

XV. CNC lathe PM (Preventive Maintenance)