Washtenaw Community College Comprehensive Report

NCT 123 2D CAD CAM CNC Programming for Mills and Lathes
Effective Term: Fall 2025

Course Cover

College: Advanced Technologies and Public Service Careers
Division: Advanced Technologies and Public Service Careers
Department: Advanced Manufacturing
Discipline: Numerical Control
Course Number: 123
Org Number: 14400
Full Course Title: 2D CAD CAM CNC Programming for Mills and Lathes
Transcript Title: 2D CAD CAM CNC Programming
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Three Year Review / Assessment Report
Change Information:
    Objectives/Evaluation
Rationale: This course requires updating to reflect a more refined structure that has become shaped over the last few semesters.
Proposed Start Semester: Fall 2025
Course Description: In this course, students will use geometry creation skills to create tool paths for drilling operations, arc hole patterns, hole patterns, slotting, facing, contouring, and pocket milling. The computer-aided manufacturing (CAM) files will be posted to the vertical computer numerical control (CNC) machine tools to create milled parts. Lathe cycles such as facing, internal and external roughing, grooving, and threading will be used with the CAM software to produce parts on the CNC horizontal lathes.

Course Credit Hours

Variable hours: No
Credits: 2
Lecture Hours: Instructor: 30 **Student:** 30
Lab: Instructor: 30 **Student:** 30
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 60 **Student:** 60
Repeatable for Credit: NO
Grading Methods: Letter Grades
Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

No Level Required

Requisites
Prerequisite
NCT 101 minimum grade "C"
and
Prerequisite
NCT 120 minimum grade "C"

General Education

Request Course Transfer
Proposed For:
Eastern Michigan University

Student Learning Outcomes

1. Create 2D tool paths for milling operations.
    Assessment 1
    Assessment Tool: Outcome-related capstone projects
    Assessment Date: Spring/Summer 2026
    Assessment Cycle: Every Three Years
    Course section(s)/other population: All
    Number students to be assessed: All
    How the assessment will be scored: Departmentally-developed rubric
    Standard of success to be used for this assessment: 75% of the students will score 75% or higher.
    Who will score and analyze the data: Departmental faculty

2. Create 2D tool paths for lathe operations.
    Assessment 1
    Assessment Tool: Outcome-related capstone projects
    Assessment Date: Fall 2026
    Assessment Cycle: Every Three Years
    Course section(s)/other population: All
    Number students to be assessed: All
    How the assessment will be scored: Departmentally-developed rubric
    Standard of success to be used for this assessment: 75% of the students will score 75% or higher.
    Who will score and analyze the data: Departmental faculty

3. Create 3D tool paths for milling operations.
    Assessment 1
    Assessment Tool: Outcome-related capstone projects
    Assessment Date: Spring/Summer 2026
    Assessment Cycle: Every Three Years
    Course section(s)/other population: All
    Number students to be assessed: All
    How the assessment will be scored: Departmentally-developed rubric
    Standard of success to be used for this assessment: 75% of the students will score 75% or higher.
    Who will score and analyze the data: Departmental faculty

4. Write and modify post files to run the CNC machine tools.
    Assessment 1
    Assessment Tool: Outcome-related capstone projects

Assessment Date: Spring/Summer 2026
Assessment Cycle: Every Three Years
Course section(s)/other population: All
Number students to be assessed: All
How the assessment will be scored: Departmentally-developed rubric
Standard of success to be used for this assessment: 75% of the students will score 75% or higher.
Who will score and analyze the data: Departmental faculty

Course Objectives

1. Create and manage a library of custom cutting tools.
2. Generate customized fixtures and other assemblies of objects within the CAD/CAM software.
3. Apply tool path geometry to drilling and other hole-producing operations using cut control options within the tool path pallets.
4. Apply tool path geometry to face cutting using cut control options within the tool path pallets.
5. Apply tool path geometry to contour cutting operations using cut control options within the tool path pallets.
6. Apply tool path geometry to irregular-shaped pockets using cut control options within the tool path pallets.
7. Apply tool path geometry for lathe external operations using cut control options within the tool path pallets.
8. Generate code to fabricate parts at the CNC machines using tool paths generated with the CAD/CAM software.
9. Apply tool path geometry for the roughing of 3D workpieces using cut control options within the tool path pallets.
10. Apply tool path geometry for the finishing of 3D workpieces using cut control options within the tool path pallets.
11. Create 3D workpiece geometry using advanced CAD modeling tools.
12. Apply tool path geometry for lathe internal operations using cut control options within the tool path pallets.
13. Define shapes of material based on finished workpieces within the CAD/CAM software.
14. Create realistic simulations to represent the fabrication of parts at CNC machines.

New Resources for Course

Course Textbooks/Resources

Textbooks
Manuals
Periodicals
Software

Equipment/Facilities

Level III classroom
Computer workstations/lab

Reviewer	Action	Date
Faculty Preparer:		
Andrew Dubuc	*Faculty Preparer*	*Jun 30, 2024*
Department Chair/Area Director:		
Allan Coleman	*Recommend Approval*	*Jul 03, 2024*
Dean:		
Eva Samulski	*Recommend Approval*	*Jul 12, 2024*
Curriculum Committee Chair:		

Randy Van Wagnen	*Recommend Approval*	*Jun 10, 2025*

Assessment Committee Chair:

Jessica Hale	*Recommend Approval*	*Jun 10, 2025*

Vice President for Instruction:

Brandon Tucker	*Approve*	*Jun 12, 2025*

Washtenaw Community College Comprehensive Report

NCT 123 2D CAD CAM CNC Programming for Mills and Lathes
Effective Term: Fall 2022

Course Cover
College: Advanced Technologies and Public Service Careers
Division: Advanced Technologies and Public Service Careers
Department: Advanced Manufacturing
Discipline: Numerical Control
Course Number: 123
Org Number: 14400
Full Course Title: 2D CAD CAM CNC Programming for Mills and Lathes
Transcript Title: 2D CAD CAM CNC Programming
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Course Change
Change Information:
    Pre-requisite, co-requisite, or enrollment restrictions
Rationale: This course does utilize our CNC lab. Requiring knowledge of machines obtained in NCT 101. Adding only prereq at this time.
Proposed Start Semester: Fall 2022
Course Description: In this course, students will use geometry creation skills to create tool paths for drilling operations, arc hole patterns, hole patterns, slotting, facing, contouring, and pocket milling. The computer-aided manufacturing (CAM) files will be posted to the vertical computer numerical control (CNC) machine tools to create milled parts. Lathe cycles such as facing, internal and external roughing, grooving, and threading will be used with the CAM software to produce parts on the CNC horizontal lathes.

Course Credit Hours
Variable hours: No
Credits: 2
Lecture Hours: Instructor: 30 **Student:** 30
Lab: Instructor: 30 **Student:** 30
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 60 **Student:** 60
Repeatable for Credit: NO
Grading Methods: Letter Grades
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing
College-level Reading & Writing

College-Level Math
No Level Required

Requisites
Prerequisite
NCT 101 minimum grade "C"

and
Prerequisite
NCT 120 minimum grade "C"

General Education

Request Course Transfer
Proposed For:
Eastern Michigan University

Student Learning Outcomes

1. Create 2D tool paths for milling operations.
   Assessment 1
   Assessment Tool: Outcome-related capstone projects
   Assessment Date: Fall 2022
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All
   Number students to be assessed: All
   How the assessment will be scored: Departmentally-developed rubric
   Standard of success to be used for this assessment: 75% of the students will score 75% or greater.
   Who will score and analyze the data: Departmental faculty

2. Create 2D tool paths for lathe operations.
   Assessment 1
   Assessment Tool: Outcome-related capstone projects
   Assessment Date: Fall 2022
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All
   Number students to be assessed: All
   How the assessment will be scored: Departmentally-developed rubric
   Standard of success to be used for this assessment: 75% of the students will score 75% or greater.
   Who will score and analyze the data: Departmental faculty

3. Write and modify post files to run the CNC machine tools.
   Assessment 1
   Assessment Tool: Outcome-related capstone projects
   Assessment Date: Fall 2022
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All
   Number students to be assessed: All
   How the assessment will be scored: Departmentally-developed rubric
   Standard of success to be used for this assessment: 75% of the students will score 75% or greater.
   Who will score and analyze the data: Departmental faculty

Course Objectives
1. Utilize all software functions that control drilling holes.
2. Apply tool path geometry to drilling and other hole-producing operations using cut control options within the tool path pallets.
3. Apply tool path geometry to face cutting using cut control options within the tool path pallets.
4. Apply tool path geometry to contour cutting operations using cut control options within the tool path pallets.

5. Apply tool path geometry to produce slots of varying depth using geometry and cut control options within the tool path pallets.
6. Apply tool path geometry to circular pockets using cut control options within the tool path pallets.
7. Apply tool path geometry to irregular shaped pockets using cut control options within the tool path pallets.
8. Apply tool path geometry to irregular shaped pockets with islands using cut control options within the tool path pallets.
9. Generate geometry for lathe parts.
10. Apply tool path geometry to face parts at the lathe using cut control options within the tool path pallets.
11. Apply tool path geometry to rough and finish turn part external features at the lathe using cut control options within the tool path pallets.
12. Apply tool path geometry to rough and finish turn part internal features at the lathe using cut control options within the tool path pallets.
13. Apply tool path geometry to cut shaped features (grooves, knurls) at the lathe using cut control options within the tool path pallets.
14. Set up and cut parts at the CNC vertical mills using tool paths generated with the CAD/CAM software.
15. Set up and cut parts at the CNC turning centers using tool paths generated with the CAD/CAM software.

New Resources for Course

Course Textbooks/Resources
Textbooks
Manuals
Periodicals
Software

Equipment/Facilities
Level III classroom
Computer workstations/lab

Reviewer	Action	Date
Faculty Preparer:		
Allan Coleman	*Faculty Preparer*	*Jan 17, 2022*
Department Chair/Area Director:		
Allan Coleman	*Recommend Approval*	*Jan 17, 2022*
Dean:		
Jimmie Baber	*Recommend Approval*	*Jan 18, 2022*
Curriculum Committee Chair:		
Randy Van Wagnen	*Recommend Approval*	*Feb 16, 2022*
Assessment Committee Chair:		
Shawn Deron	*Recommend Approval*	*Feb 23, 2022*
Vice President for Instruction:		
Kimberly Hurns	*Approve*	*Feb 23, 2022*

Washtenaw Community College Comprehensive Report

NCT 123 2D CAD CAM CNC Programming for Mills and Lathes
Effective Term: Fall 2016

Course Cover
Division: Advanced Technologies and Public Service Careers
Department: Industrial Technology
Discipline: Numerical Control
Course Number: 123
Org Number: 14400
Full Course Title: 2D CAD CAM CNC Programming for Mills and Lathes
Transcript Title: 2D CAD CAM CNC Programming
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: New Course
Change Information:
Rationale: This course, combined with NCT120 created, will replace what was NCT249. Upon approval of NCT120 and NCT123 the NCT249 (4 credit) will be deactivated and replaced with these two classes.
Proposed Start Semester: Fall 2016
Course Description: In this course, students will use geometry creation skills to create tool paths for drilling operations, arc hole patterns, hole patterns, slotting, facing, contouring, and pocket milling. The CAM files will be posted to the vertical CNC machine tools to create milled parts. Lathe cycles such as facing, internal and external roughing, grooving, and threading will be used with the CAM software to produce parts on the CNC horizontal lathes. This course contains material previously taught in NCT 249.

Course Credit Hours
Variable hours: No
Credits: 2
Lecture Hours: Instructor: 30 **Student:** 30
Lab: Instructor: 30 **Student:** 30
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 60 **Student:** 60
Repeatable for Credit: NO
Grading Methods: Letter Grades
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing
College-level Reading & Writing

College-Level Math
No Level Required

Requisites
Prerequisite
NCT 120 minimum grade "C"

General Education

Request Course Transfer
Proposed For:
Eastern Michigan University

Student Learning Outcomes

1. Create 2D tool paths for milling operations.
    ### Assessment 1
    Assessment Tool: Capstone project art to program
    Assessment Date: Fall 2018
    Assessment Cycle: Every Three Years
    Course section(s)/other population: All
    Number students to be assessed: All
    How the assessment will be scored: departmentally-developed rubric
    Standard of success to be used for this assessment: 75% of the students will score 75% or greater.
    Who will score and analyze the data: Department Faculty

2. Create 2D tool paths for lathe operations.
    ### Assessment 1
    Assessment Tool: Capstone project art to program
    Assessment Date: Fall 2019
    Assessment Cycle: Every Three Years
    Course section(s)/other population: All
    Number students to be assessed: All
    How the assessment will be scored: departmentally-developed rubric
    Standard of success to be used for this assessment: 75% of the students will score 75% or greater.
    Who will score and analyze the data: Department Faculty

3. Write and modify post files to run the CNC machine tools.
    ### Assessment 1
    Assessment Tool: Capstone project art to program
    Assessment Date: Fall 2019
    Assessment Cycle: Every Three Years
    Course section(s)/other population: All
    Number students to be assessed: All
    How the assessment will be scored: departmentally-developed rubric
    Standard of success to be used for this assessment: 75% of the students will score 75% or greater.
    Who will score and analyze the data: Department Faculty

Course Objectives
1. Learn how to use all functions involving drill control.
2. Apply tool path geometry to drilling and other hole producing operations using cut control options within the tool path pallets.
3. Apply tool path geometry to face cutting using cut control options within the tool path pallets.
4. Apply tool path geometry to contour cutting operations using cut control options within the tool path pallets.
5. Apply tool path geometry to produce slots of varying depth using geometry and cut control options within the tool path pallets.
6. Apply tool path geometry to circular pockets using cut control options within the tool path pallets.
7. Apply tool path geometry to irregular shaped pockets using cut control options within the tool path pallets.
8. Apply tool path geometry to irregular shaped pockets with islands using cut control options

within the tool path pallets.

9. Generate geometry for lathe parts.
10. Apply tool path geometry to face parts at the lathe using cut control options within the tool path pallets.
11. Apply tool path geometry to rough and finish turn part external features at the lathe using cut control options within the tool path pallets.
12. Apply tool path geometry to rough and finish turn part internal features at the lathe using cut control options within the tool path pallets.
13. Apply tool path geometry to cut shaped features (grooves, knurls) at the lathe using cut control options within the tool path pallets.
14. Setup and cut parts at the CNC vertical mills using tool paths generated with the CAD/CAM software.
15. Setup and cut parts at the CNC turning centers using tool paths generated with the CAD/CAM software.

New Resources for Course

Course Textbooks/Resources
Textbooks
Manuals
Periodicals
Software

Equipment/Facilities
Level III classroom
Computer workstations/lab

Reviewer	Action	Date
Faculty Preparer:		
Thomas Penird	*Faculty Preparer*	*Aug 29, 2015*
Department Chair/Area Director:		
Thomas Penird	*Recommend Approval*	*Aug 29, 2015*
Dean:		
Brandon Tucker	*Recommend Approval*	*Oct 06, 2015*
Curriculum Committee Chair:		
Kelley Gottschang	*Recommend Approval*	*Nov 30, 2015*
Assessment Committee Chair:		
Michelle Garey	*Recommend Approval*	*Dec 01, 2015*
Vice President for Instruction:		
Michael Nealon	*Approve*	*Dec 14, 2015*