

Program Information Report

CTNCPC

School of Advanced Manufacturing Systems

Whether your interest is in manufacturing or automation, the programs in the School of Advanced Manufacturing Systems will fit your needs. Maintain and troubleshoot the machines that make commercial goods by specializing in one or more aspects of the machining industry. Develop entry level or advanced skills in electronics, automation hydraulics or numerical controls.

Washtenaw Community College offers programs at several levels for students who want to begin new careers, or advance in their existing careers. The first level is the certificate, which can vary from nine to thirty-six credits, depending on the field. Certificates generally prepare students for entry-level jobs.

After completing a certificate, students can progress to the next level, the advanced certificate. The credit hours required for these programs also vary. This type of certificate provides a more specialized level of skill development, and often allows students to upgrade their positions at their places of employment.

The next level, an Associate in Applied Science, is available for some programs. For some career fields, it is possible to earn a certificate, advanced certificate, and an Associate in Applied Science degree in the same field. In these cases, the credit hours from the certificate and advanced certificate can be applied to the credit hours needed for the Associate in Applied Science degree.

Alternatively, students can earn an AAS in Occupational Studies by completing a certificate, an advanced certificate (if one exists) and General Education requirements.

Manufacturing

Develop skills needed to be a numerical control operator or utilize your imagination in the field of manufacturing.

Program Information Report

Numerical Control Programming (CTNCPC)

Certificate

Program Effective Term: Fall 2015

High Demand Occupation High Skill Occupation High Wage Occupation

This program prepares students for jobs as a numerical control operator or programmer. The program gives students skills in manual and computer assisted programming languages, using CAD/CAM software to program challenging and complex 2 and 3 axes CNC machine tool operations. Students will also become proficient in the interpretation of engineering drawings, visualization of machine operations, and the setup requirements of numerical controlled machine tools.

Articulation:

Eastern Michigan University, several BS degrees.

Copies can be obtained from the Counseling Office, a program advisor, or from the Curriculum and Assessment Office Web site: <http://www.wccnet.edu/departments/curriculum/articulation.php?levelone=colleges>.

Major/Area Requirements (14 credits)

NCT 110	Introduction to Computerized Machining (CNC) - II	2
NCT 121	Manual Programming and NC Tool Operation	4
NCT 221	Advanced Manual Programming and NC Tool Operation	4
NCT 249	CAD/CAM CNC Programming	4

Core Courses (8 credits)

MEC 100	Materials and Processes	3
BMG 241	Innovation: Process and Application	1
FLP 101	Fluid Power Fundamentals - I	2
MTT 102	Machining for Auto Applications	2
NCT 101	Introduction to Computerized Machining (CNC) - I	2
ROB 101	Robotics I - I	2

**Core courses must be taken before Major/Area Requirements.*

Minimum Credits Required for the Program: 26

Notes:

This certificate can also lead to an associate degree in Automation Technology or Occupational Studies.

PROGRAM CHANGE OR DISCONTINUATION FORM

Program Code: CTNCPC

Program Name: Numerical Control Certificate

Effective Term: Fall 2008

Division Code: HAT

Department: Industrial Technology (INTD)

Directions:

1. Attach the current program listing from the WCC catalog or Web site and indicate any changes to be made.
2. Draw lines through any text that should be deleted and write in additions. Extensive narrative changes can be included on a separate sheet.
3. Check the boxes below for each type of change being proposed. Changes to courses, discontinuing a course, or adding new courses as part of the proposed program change, must be approved separately using a Master Syllabus form, but should be submitted at the same time as the program change form.

Requested Changes:

- ☐ Review
- ☒ Remove course(s): MIT 111, NCT 112
- ☒ Add course(s): AMS103, BMG241, FLP101, MIT102, NCT101, NCT 110, ROB101,
- ☐ Program title (title was _____)
- ☐ Description
- ☐ Type of award
- ☐ Advisors
- ☐ Articulation information
- ☐ Program admission requirements
- ☐ Continuing eligibility requirements
- ☐ Program outcomes
- ☐ Accreditation information
- ☐ Discontinuation (attach program discontinuation plan that includes transition of students and timetable for phasing out courses)
- ☒ Other Required Core Courses (12 credits):
- AMS 103 3 credits
 - BMG 241 1 credit
 - FLP 101 2 credits
 - MIT 102 2 credits
 - NCT 101 2 credits
 - ROB 101 2 credits

Show all changes on the attached page from the catalog.

Rationale for proposed changes or discontinuation:

Provide students with core courses of basics skills common to all INTD certificate and degree programs.

Financial/staffing/equipment/space implications:

None

List departments that have been consulted regarding their use of this program.

Business and Computer Technologies Division – Rosemary Wilson, Dean

Vocational Technologies Division, - Bruce Greene, Dean

Signatures:

Reviewer	Print Name	Signature	Date
Initiator	Tom Penird/ Gary Schultz		3/4/08
Department Chair	Tom Penird/ Gary Schultz		3/4/08
Division Dean/Administrator	Granville Lee		2/27/08
Vice President for Instruction	Roger Palay		3/13/08
President	Larry Whitworth		

Do not write in shaded area. Entered in: Banner _____ C&A Database 4/10 Log File 2/28/08 Board Approval _____

Please submit completed form to the Office of Curriculum and Assessment and email an electronic copy to sjohn@wccnet.edu for posting on the website.

Program Information Report

School of Advanced Manufacturing Systems

Manufacturing

Numerical Control Programming (CTNCPC)

Certificate

Program Effective Term: Fall 2008

This program prepares students for jobs as a numerical control operator or programmer. The program gives students skills in manual and computer assisted programming languages, using CAD/CAM software to program challenging and complex 2 and 3 axes CNC machine tool operations. Students will also become proficient in the interpretation of engineering drawings, visualization of machine operations, and the setup requirements of numerical controlled machine tools.

Articulation:

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<http://www.wccnet.edu/departments/curriculum/articulation.php?levelone=colleges>.

Core Courses		(12 credits)
AMS 103	Materials and Processes	3
BMG 241	Innovation: Process and Application	1
FLP 101	Fluid Power Fundamentals - I	2
MTT 102	Machining for Auto Applications	2
NCT 101	Introduction to Computerized Machining (CNC) - I	2
ROB 101	Robotics I - I	2

**Core courses must be taken before Major/Area Requirements.*

Major/Area Requirements		(14 credits)
NCT 110	Introduction to Computerized Machining (CNC) - II	2
NCT 121	Manual Programming and NC Tool Operation	4
NCT 221	Advanced Manual Programming and NC Tool Operation	4
NCT 249	CAD/CAM CNC Programming	4

Minimum Credits Required for the Program:

26

Notes:

This certificate can also lead to an associate degree in Automation Technology or Occupational Studies.

PROGRAM CHANGE FORM

new code: CTNCPC
 Program Code: Program Name:

CVNCP

Numerical Control Programming Certificate

Effective Term:

Fall 2004

Directions:

1. Attach the current program listing from the WCC catalog and indicate any changes to be made.
2. Draw lines through any text that should be deleted and write in additions. Extensive narrative changes can be included on a separate sheet.
3. Check the boxes below for each type of change being proposed. Changes to courses, discontinuing a course, or adding new courses as part of the proposed program change, must be approved separately using a Course Syllabus Form, but should be submitted at the same time as the program change form.

Requested Changes:

☒ Remove NCT 236: SURFCAM CNC Programming course(s)

☒ Add course(s):

- MTT 111: Machine Shop Theory and Practice
- NCT 112: Introduction to Computerized Machining (CNC)

☒ Total credits: Current credits 18 After changes 20
☒ Title (title was Numerical Control Programming Advanced Certificate
☒ Description Attached
☐ Advisors

☐ Articulation information

☒ Program admission requirements

☐ Continuing eligibility requirements

☐ Program outcomes

Other _____

Show all changes on the attached page from the catalog.

Rationale for proposed changes:

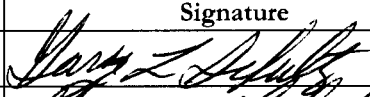
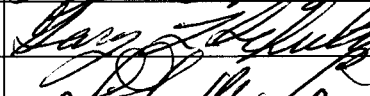
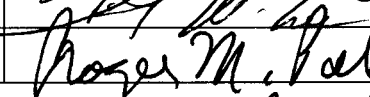
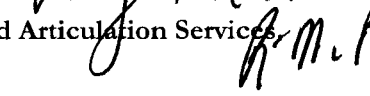
Align with the restructure of the Robotics Technology to Automation Technology Degree Program..

Financial/staffing/equipment/space implications:

None

List departments that have been consulted regarding the use of this program.

Signatures:

Reviewer	Print Name	Signature	Date
Program Change Initiator	Gary Schultz		3/19/04
Department Chair	Gary Schultz		3/19/04
Division Dean/Administrator	Granville Lee		3/25/04
Vice President for Instruction	Roger Palay		3/25/04

Please submit completed form to the Office of Curriculum and Articulation Services.

Office of Curriculum & Articulation Services

Program Change Form 8-2003

Access Program File 3/30Log 3/30

Copied and Returned _____

MAY 10 2004

Office of Curriculum & Articulation Services

Industrial and Engineering Technology

Numerical Control Programming (CTNCPC)

'UNDER CONSTRUCTION'

Certificate

Program Effective Term: Fall 2004

This program prepares you for jobs as a numerical control operator or programmer. The program gives you skills in manual and computer assisted programming languages, using CAD/CAM software to program challenging and complex 2 and 3 axes CNC machine tool operations. You will also become proficient in the interpretation of engineering drawings, visualization of machine operations, and the setup requirements of numerical controlled machine tools.

Major/Area Requirements		(20 credits)
MTT 111	Machine Shop Theory and Practice	4
NCT 112	Introduction to Computerized Machining (CNC)	4
NCT 121	Manual Programming and NC Tool Operation	4
NCT 221	Advanced Manual Programming and NC Tool Operation	4
NCT 249	CAD/CAM CNC Programming	4

Minimum Credits Required for the Program: 20

Notes:

This certificate can also lead to an associate degree in Automation Technology or Occupational Studies.

Program Approval Document
Advanced Certificate
In
NUMERICAL CONTROL
PROGRAMMING

Prepared by

Roger Dick
Industrial Technology Department
Washtenaw Community College

April 25, 1999

**WASHTENAW COMMUNITY COLLEGE
PROGRAM AUTHORIZATION FORM**

1. Program Title: Numerical Control Programming Program Code: NCP
 2. Division: TEC 3. Department: IND CIP Code: _____
 4. Type of Program: ☐ A.A. ☐ A.S. ☐ A.A.S. ☐ A.T.S.
☒ Advanced Certificate ☐ Mastery Certificate ☐ Achievement Certificate ☐ Certificate of Completion
 5. Will this program be Perkins funded? ☒ yes ☐ no 6. Effective Year: Fall 1999

7. Program Description (for Catalog, brochures, etc.):
 SURFCAM and MASTERCAM CAD/CAM software are used extensively in this program. Challenging and complex 2, 3 and 4 Axis CNC machine tool operations are programmed through the use of these software packages. Persons who achieve this certificate are skilled in producing full 3-D CAD data bases and surfaces required for machining. Given engineering drawings, students are responsible for geometry creation, generation of the cutter paths, CNC machine tool set up and operation, to make completed parts to specific size and shape in the CNC laboratory.

8. Advisors: Roger Dick, Jeffrey Donahey

9. Admissions Criteria:	10. Criteria for Continuing Program Eligibility:
Successful completion of Machine Operator Achievement Certificate and Machine Tool Operation Mastery Certificate or the equivalent in work experience.	

11. Attach a Program Approval Document [PAD], which includes the following:
 A. Program Description D. Enrollment Projections
 B. Program Goals E. Program Cost Analysis
 C. Needs Assessment F. Course Descriptions

G. Analysis of Affected Instructional Units
 H. Articulations
 I. Licensure/Accreditation

Approval Recommended:	Print Name	Signature	Date
Program Initiator:	<u>Roger Dick</u>	_____	_____
Department Chair/Director:	<u>George Agin</u>	_____	_____
Dean:	<u>Roger Bertoia</u>	_____	_____
VP, Instruction/Student Services:	<u>Guy Altieri</u>	_____	_____
President:	<u>Larry Whitworth</u>	_____	_____
Date of Board Approval:	<u>May 25, 1999</u>		

Available on disk

COURSE REQUIREMENTS FOR PROGRAM

This program requires completion of all courses in the Machine Tool Operation Mastery Certificate Program (13 credits) and the Machine Operator Achievement Certificate Program (13 credits)

Course	Title	Credit	Pre-requisites/Co-requisites
IND 216	Introduction to CAD	2	
NCT 247	Advanced CAM Machine Tool Programming	4	
NCT 249	Mastercam Machine Tool Programming	4	
Prior credits from Machine Operator Achievement Certificate: Prior credits from Machine Tool Operation Mastery Certificate		10	
		13	
		13	
Total Credits:		26 10	

A. PROGRAM DESCRIPTION

SURFCAM and **MASTERCAM** CAD/CAM software are used extensively in this program. Challenging and complex 2, 3 and 4 Axis CNC machine tool operations are programmed through the use of these software packages. Persons who achieve this certificate are skilled in producing full 3-D CAD databases and surfaces required for machining. Given engineering drawings, students are responsible for geometry creation, generation of the cutter paths, CNC machine tool set up and operation, to make completed parts to specific size and shape in the CNC laboratory.

B. PROGRAM GOALS

The overall goal of this program is to produce high level training in the computer numerical control field either to obtain an advanced position or to update current skills. Graduates qualify as Computer Assist CNC Programmers.

C. NEEDS ASSESSMENT

Employment Outlook:

According to the U.S. Bureau of Labor statistics and the Michigan Occupational Information System, there are approximately 7,000 computer numerically controlled machine tool programmers employed nationally. Employment is expected to increase at the average or more slowly than average for all occupations through the year 2005.

As the economy grows, the demand for products that use machined parts or tooling for molded parts will increase. To remain competitive, American firms will increasingly use numerical control and other automated machining equipment to increase productivity, lower labor costs, and increase product quality. As more American firms install numerically controlled machine tools, the demand for Tool Programmers will rise. However, this rising demand will be offset by anticipated further increases in the level of imports and by the standardization of programming languages.

Employment in Michigan is expected to increase about as fast as the average for all occupations through the year 2005.

Estimated Earnings:

Nationally, computer numerically controlled computer assist machine tool programmers had average hourly earnings of \$18.00 - \$25.00.

In Michigan, the average hourly earnings were approximately \$24.00 in Detroit and \$19.59 in several other cities.

D. ENROLLMENT PROJECTIONS

Enrollments:

We expect to enroll approximately 10-20 students the first semester and expect increase enrollments once this program becomes established.

Longevity:

The need for this program is expected to remain at the current level for the foreseeable future.

E. PROGRAM COST ANALYSIS

There are no additional costs for this program.

F. COURSE DESCRIPTIONS

IND 216 Introduction to CAD

The principles and applications of computer-aided drafting systems and familiarity with the hardware components of the CAD system are emphasized. Use of the interactive graphic

software, development of input and output skills, and familiarity with software, languages and systems hierarchy. AutoCAD software is featured.

NCT 247 Advanced CAM Machine Tool Programming

This course is a continuation of NCT 236. Students learn advanced geometric construction and tool path generation using CAD/CAM software. The majority of the subject matter is concerned with the creation and machining of surfaces. Ruled, Coons Patch, Swept, Revolved, Fillet and Composites are some of the surface types presented. Three and four axis CNC machine tool paths are then created and used in the machining of actual parts in the CAM laboratory using CNC machine tool equipment. Students are provided time outside of class to use the CAD/CAM workstations to complete assignments.

NCT 249 Mastercam Machine Tool Programming

G. ANALYSIS OF AFFECTED INSTRUCTIONAL UNITS

No other instructional units will be affected.

H. ARTICULATIONS

This advanced certificate articulates with the Mastery Certificate in Machine Tool Operation and the Associate in Technical Studies in Machine Tool Technology.

I. LICENSURE/ACCREDITATION (IF APPLICABLE)

NUMERICAL CONTROL CERTIFICATE
PROPOSED CURRICULUM

MACHINE OPERATOR CERTIFICATE OF ACHIEVEMENT

MTT 100	MACHINE SHOP THEORY	3 CR	45 HRS	1 Day/ WK
MTT 111	MACHINE TOOL THEORY & PRACTICE	4 CR	90 HRS	2 Days/WK
NCT 112	INTRODUCTION TO CNC MACHINING	3 CR	75 HRS	2 Days/Wk (10 WKS)
 BPR 101	BLUEPRINT READING	3 CR	45 HRS	1 Day/WK
		13 CR.		

MASTERY OF MACHINE TOOL OPERATION CERTIFICATE

MACHINE OPERATOR CERTIFICATE OF ACHIEVEMENT		13 CR.		
MTT 122	MACHINE TOOL OPERATION & SETUP	4 CR	90 HRS	2 Days/WK
NCT 121	MANUAL PROGRAMMING & NC TOOL OPERATION & SETUP	4 CR	90 HRS	2 Days/WK
QCT 100	CHARTING TECHNIQUES FOR OPERATORS	2 CR	45 HRS	1 Day/ WK
ENG 107	TECHNICAL COMMUNICATIONS	3 CR	45 HRS	1 Day/ WK
		26 CR.		

MASTERY OF NUMERICAL CONTROL TECHNOLOGY CERTIFICATE

MASTERY OF MACHINE TOOL OPERATION CERTIFICATE		26 CR.		
NCT 122	ADV. MANUAL PROGRAMMING & N/C MACHINE TOOL OPERATION & SETUP	4 CR	90 HRS	2 Days/ WK
NCT 236	CAM MACHINE TOOL PROGRAMMING	4CR	90 HRS	2 Days/ WK
MTT 103	INTRODUCTION TO MATERIALS	3 CR	45 HRS	1 Day/ WK
		37 CR.		

MASTERY OF NUMERICAL CONTROL PROGRAMMING CERTIFICATE

MASTERY OF MACHINE TOOL OPERATION CERTIFICATE		26 CR.		
IND 216	INTRODUCTION TO CAD	2 CR	60 HRS	1 Day/WK
NCT 247	ADVANCED CAM MACHINE TOOL PROGRAMMING.	4 CR	90 HRS	2 Days/WK
NCT 249	MASTERCAM MACHINE TOOL PROGRAMMING.	4 CR	90 HRS	2 Days/WK
		36 CR		

NUMERICAL CONTROL CERTIFICATE
PROPOSED CURRICULUM

MOPE

MACHINE OPERATOR CERTIFICATE OF ACHIEVEMENT

MTT 100	MACHINE SHOP THEORY	3 CR	45 HRS	1 Day/ WK
✓ MTT 111	MACHINE TOOL THEORY & PRACTICE	4 CR	90 HRS	2 Days/WK
✓ NCT 112	INTRODUCTION TO CNC MACHINING	3 CR	75 HRS	2 Days/Wk (10 WKS)
PPR 101 MTT 101	BLUEPRINT READING	3 CR	45 HRS	1 Day/WK
		13 CR.		

TDMLD

MASTERY OF MACHINE TOOL OPERATION CERTIFICATE

MACHINE OPERATOR CERTIFICATE OF ACHIEVEMENT		13 CR.		
✓ MTT 122	MACHINE TOOL OPERATION & SETUP	4 CR	90 HRS	2 Days/WK
✓ NCT 121	MANUAL PROGRAMMING & NC TOOL OPERATION & SETUP	4 CR	90 HRS	2 Days/WK
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		26 CR.		

NC

MASTERY OF NUMERICAL CONTROL TECHNOLOGY CERTIFICATE

MASTERY OF MACHINE TOOL OPERATION CERTIFICATE		26 CR.		
✓ NCT 122	ADV. MANUAL PROGRAMMING & N/C MACHINE TOOL OPERATION & SETUP	4 CR	90 HRS	2 Days/ WK
NCT 236	CAM MACHINE TOOL PROGRAMMING	4CR	90 HRS	2 Days/ WK
MTT 103	INTRODUCTION TO MATERIALS	3 CR	45 HRS	1 Day/ WK
		37 CR.		

Advanced Certificate

MASTERY OF NUMERICAL CONTROL PROGRAMMING CERTIFICATE

NCTT

MASTERY OF MACHINE TOOL OPERATION CERTIFICATE		26 CR.		
IND 216	INTRODUCTION TO CAD	2 CR	60 HRS	1 Day/WK
NCT 247	ADVANCED CAM MACHINE TOOL PROGRAMMING.	4 CR	90 HRS	2 Days/WK
NCT 249	MASTERCAM MACHINE TOOL PROGRAMMING.	4 CR	90 HRS	2 Days/WK
		36 CR		