De Anza College

21250 Stevens Creek Blvd.
Cupertino, CA 95014
408-864-5678
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Academic Year
2012 - 2013

Manufacturing and Computer Numerical Control (CNC)

MCNC Coordinator
Bldg. E2 Rm. E26A
408-864-8283

Division Office
Kirsh Center Building
Room KC 228
408-864-8773

Counseling Center
Student and Community
Services Bldg. 2nd Fl.
408-864-5400

Career Services Info.
Student and Community
Services Bldg. 2nd Fl.
408-864-5400

***Skills Certificate** (apply directly with the department)*
A passing grade ("C" or better/"P") in each required course.
Note: each course must be completed at De Anza College.

Certificate of Achievement Level Requirements
A minimum "C" grade in each major course.
Note: A maximum of six (6) quarter units may be transferred from other academic institutions.

Certificate of Achievement-Advanced Level Requirements
1. A minimum "C" grade in each major course.
2. Demonstrated proficiency in English and mathematics as evidenced by eligibility for EWRT 1A or ESL 5 and eligibility for MATH 114.
   Note: A maximum of 18 quarter units may be transferred from other academic institutions.

A.A./A.S. Degree
1. Completion of all General Education (GE) requirements (31-42 quarter units) for the A.A./A.S. degree. GE units must be completed with a minimum 2.0 GPA ("C" average).
2. Completion of all major requirements. Each major course must be completed with a minimum "C" grade.
   Major courses can also be used to satisfy GE requirements (except for Liberal Arts degrees).
   Note: A maximum of 22 quarter units from other academic institutions may be applied toward the major.
3. Completion of a minimum of 90 degree-applicable quarter units (GE and major units included). All De Anza courses must be completed with a minimum 2.0 GPA ("C" average). All De Anza courses combined with courses transferred from other academic institutions must be completed with a minimum 2.0 GPA ("C" average).
   Note: A minimum of 24 quarter units must be earned at De Anza College.

Major courses for certificates and degrees must be completed with a letter grade unless a particular course is only offered on a pass/no-pass basis.

CAD/CAM - Mastercam

Skills Certificate

Skills Certificates are issued by the individual departments and are not notated on official college transcripts. Please contact the MCNC coordinator directly for assistance and to apply for Skills Certificates.

The CAD/CAM Mastercam Skills certificate program teaches students 2D, 3D, lathe and multi-axis machine tool programming. Students learn to construct geometry, select tools, and produce and verify tool paths. Upon completion, students are prepared for employment as entry-level programmers in prototype and production manufacturing facilities. This certificate is part of a career ladder. Students may also choose to complete a certificate of achievement-advanced or A.S. degree.

Student Learning Outcomes - upon completion, students will be able to:
- design and construct 2D, 3D, lathe, horizontal and multi-axis part geometry.
- select tools and produce tool paths with constructed and imported geometry.
- verify tool paths and create word address programs for CNC machines.

Complete each required course at De Anza College with a passing grade ("C" or better/"P").

Complete one (1) course from: 4.5
MCNC 76C - 76E series (introductory) (4.5 each)
CAD/CAM Based CNC Programming Using Mastercam

Complete one (1) course from: 4.5
MCNC 76G - 76K series (4.5 each)
CAD/CAM Based CNC Programming Using Mastercam

Complete one (1) course from: 4.5
MCNC 76M - 76Q series (4.5 each)
Advanced CAD/CAM Based CNC Programming Using Mastercam

Total Units Required 13.5

CNC Machine Operator

Skills Certificate

Skills Certificates are issued by the individual departments and are not notated on official college transcripts. Please contact the department directly for assistance and to apply for Skills Certificates.

The Computer Numerical Control (CNC) Machine Operator Skills certificate program teaches students the fundamentals of conventional and CNC machine tools. Students learn how to set-up safely and operate manual mills and lathes and construct word address programs for the set-up and operation of CNC mills. Upon completion, students are prepared for employment in manufacturing facilities as set-up persons, machine operators and production workers. This certificate is part of a career ladder. Students may also choose to complete a certificate of achievement-advanced or A.S. degree.

Student Learning Outcomes - upon completion, students will be able to:
- set up and operate conventional and CNC machines safely.
- construct and inspect machined projects using conventional and CNC equipment.
- construct word address programs to machine projects.

Complete each required course at De Anza College with a passing grade ("C" or better/"P").

MCNC 71	Introduction to Machining & CNC Processes	4.5
MCNC 75A	Intro. to Computer-Aided Numerical Control (CNC) Programming and Operation: Mills	4.5
MCNC 75B	Computer-Aided Numerical Control (CNC) Programming & Operation: Lathes, Adv. Mills	4.5
	Total Units Required	13.5

CNC Machinist

Certificate of Achievement-Advanced
A.S. Degree

The CNC Machinist Certificate of Achievement-Advanced and AS degree programs teach students the fundamentals of CNC machine tools. Students learn safe set-up, editing and operation of CNC equipment, including vertical and horizontal mills, lathes and rotary multi-axis components. Students are taught to dimension and inspect parts using various inspection methods, and to analyze materials and processes used in manufacturing. Upon completion, students are prepared for employment in manufacturing facilities as CNC set-up persons and machine operators.

Student Learning Outcomes - upon completion, students will be able to:

- construct and inspect machined projects using CNC equipment with word address programs.
- apply geometric dimensioning and tolerance standards to inspect drawings and inspect parts using a coordinate measuring machine.
- differentiate and analyze the materials and processes used in manufacturing.
- produce tool paths with constructed and imported geometry using Mastercam.
- apply advanced machining skills by independently contracting projects.

Certificate of Achievement-Advanced

1. Meet the requirements for this certificate level.
2. Complete the following.

Complete two (2) units from:		2
MCNC 56	Special Projects in Manufacturing and CNC (1)	
MCNC 56X	Special Projects in Manufacturing and CNC (2)	
Complete the following:		
MCNC 64	Manufacturing Materials and Processes	4
MCNC 71	Introduction to Machining and CNC Processes	4.5
MCNC 72	Applied Geometric Inspection Dimensioning and Tolerancing; Coordinate Measuring Machines	3
MCNC 75A	Intro. to Computer-Aided Numerical Control (CNC) Programming and Operation: Mills	4.5
MCNC 75B	Computer-Aided Numerical Control (CNC) Programming & Operation: Lathes, Adv. Mills	4.5
MCNC 75C	CNC Lathes & Horizontal Machining Centers; Programming & Operation, 4th Rotary Axis, Fixture Design	4.5
Complete one (1) course from:		4.5
MCNC 76C - 76E series (introductory) (4.5 each) CAD/CAM Based CNC Programming Using Mastercam		
Complete one (1) course from:		4.5
MCNC 76G - 76K series (4.5 each) CAD/CAM Based CNC Programming Using Mastercam		
Complete one (1) course from:		4.5
MCNC 76M - 76Q series (4.5 each) Advanced CAD/CAM Based CNC Programming Using Mastercam		
	Total Units Required	40.5

A.S. Degree

Meet the A.A./A.S. degree requirements.

Major	Complete the course requirements for the CNC Machinist Certificate of Achievement-Advanced	40.5 units
GE	General Education (31-42 units)	
Electives	Elective courses req'd. when major units plus GE units total is less than 90	
	Total Units Required	90 units

CNC Research and Development Machinist

Certificate of Achievement-Advanced
A.S. Degree

The certificate of achievement-advanced and AS degree programs teach students the fundamentals of conventional and CNC machine tools. Students learn to set up safely and operate manual mills, lathes, surface grinders, and CNC equipment, including vertical and horizontal mills, lathes and rotary multi-axis components. They also learn to produce word address programs with CAD/CAM software. Students are taught to dimension and inspect parts using various inspection methods, and to analyze materials and processes used in manufacturing. Upon completion, students are prepared for employment working closely with engineers in a research and development environment.

Student Learning Outcomes - upon completion, students will be able to:

- construct and inspect machined projects using conventional and CNC equipment using word address programs.
- apply geometric dimensioning and tolerance standards to inspect drawings and inspect parts using a coordinate measuring machine.
- differentiate and analyze the materials and processes used in manufacturing.
- analyze, construct, and inspect diagrams to repair physical and electrical components.
- produce tool paths with constructed and imported geometry using Mastercam.

Certificate of Achievement-Advanced

1. Meet the requirements for this certificate level.
2. Complete the following.

MCNC 64	Manufacturing Materials and Processes	4
MCNC 71	Introduction to Machining and CNC Processes	4.5
MCNC 72	Applied Geometric Inspection Dimensioning & Tolerancing; Coordinate Measuring Machines	3
MCNC 75A	Intro. to Computer-Aided Numerical Control (CNC) Programming and Operation: Mills	4.5
MCNC 75B	Computer-Aided Numerical Control (CNC) Programming & Operation: Lathes, Adv. Mills	4.5
MCNC 75C	CNC Lathes & Horizontal Machining Centers; Programming & Operation, 4th Rotary Axis, Fixture Design	4.5
MCNC 77	Machining Practices Using Conventional Machine Tools, Tool Design, Abrasive Machining	4.5
AUTO 53A	Automotive Mechanisms	3
AUTO 53B	Automotive Electromechanical Systems	2
Complete one (1) course from:		4.5
MCNC 76C - 76E series (introductory) (4.5 each) CAD/CAM Based CNC Programming Using Mastercam		
Complete one (1) course from:		4.5
MCNC 76G - 76K series (4.5 each) CAD/CAM Based CNC Programming Using Mastercam		
Complete one (1) course from:		4.5
MCNC 76M - 76Q series (4.5 each) Advanced CAD/CAM Based CNC Programming Using Mastercam		
	Total Units Required	48

A.S. Degree

Meet the A.A./A.S. degree requirements.

Major	Complete the course requirements for the CNC Research and Develop. Machinist Cert. of Achievement-Advanced	48 units
GE	General Education (31-42 units)	
Electives	Elective courses req'd. when major units plus GE units total is less than 90	
	Total Units Required	90 units

Manufacturing Systems Technician

Certificate of Achievement

The Manufacturing Systems Technician Certificate of Achievement teaches students the safe operation of basic and specialized machine tools. Students learn to set up safely and operate manual mills, lathes, and surface grinders as well as construct entry-level programs for operation of CNC Mills and inspect parts to repair physical and electrical components. Upon completion, students are prepared for employment for set up, maintenance, and occasional operation of a variety of automated equipment.

Student Learning Outcomes - upon completion, students will be able to:

- demonstrate safe operation of basic and specialized equipment.
- demonstrate entry-level programming skills for computer numerical controlled equipment.
- analyze, construct, and inspect parts and diagrams to repair physical and electrical components.

1. Meet the requirements for this certificate level.
2. Complete the following.

AUTO 53A	Automotive Mechanisms	3
AUTO 53B	Automotive Electromechanical Systems	2
MCNC 64	Manufacturing Materials and Processes	4
MCNC 71	Introduction to Machining & CNC Processes	4.5
MCNC 75A	Intro. to Computer-Aided Numerical Control (CNC) Programming and Operation: Mills	4.5
MCNC 77	Machining Practices Using Conventional Machine Tools, Tool Design, Abrasive Machining	4.5
	Total Units Required	22.5

Product Model Making

Certificate of Achievement-Advanced
A.S. Degree

Students in the Certificate of Achievement-Advanced and A.S. degree programs are taught the fundamentals of Product Model Making. Students learn the safe set-up of CNC equipment, how to design and construct three-dimensional objects using CAD/CAM software, and how to analyze materials and processes used in prototype model making. Upon completion, students are prepared for employment working in design-stage product development, and prototype and model making environments.

Student Learning Outcomes - upon completion, students will be able to:

- construct and inspect machined projects using conventional and CNC equipment that uses word address programs.
- design and construct three-dimensional objects.
- create part geometry using Solidworks or CREO/Pro Engineer CAD software.
- differentiate and analyze the materials and processes used in manufacturing.
- produce tool paths with constructed and imported geometry using Mastercam.

Certificate of Achievement-Advanced

1. Meet the requirements for this certificate level.
2. Complete the following.

ARTS 10A	Three-Dimensional Design	3
ARTS 10B	Intermediate Three-Dimensional Design	3
MCNC 64	Manufacturing Materials and Processes	4
MCNC 71	Introduction to Machining & CNC Processes	4.5
MCNC 75A	Intro. to Computer-Aided Numerical Control (CNC) Programming and Operation: Mills	4.5
MCNC 75B	Computer-Aided Numerical Control (CNC) Programming & Operation: Lathes, Adv. Mills	4.5
Complete one (1) course from one (1) of these series:		4
CDI 60A-F	SolidWorks (Beginning) (4 each)	
CDI 70A-F	Creo Parametric (Beginning) (4 each)	
Complete one (1) course from:		4.5
MCNC 76C - 76E series (introductory) (4.5 each)		
CAD/CAM Based CNC Programming Using Mastercam		
Complete one (1) course from:		4.5
MCNC 76G - 76K series (4.5 each)		
CAD/CAM Based CNC Programming Using Mastercam		
Complete one (1) course from:		4.5
MCNC 76M - 76Q series (4.5 each)		
Advanced CAD/CAM Based CNC Programming Using Mastercam		
	Total Units Required	41

A.S. Degree

Meet the A.A./A.S. degree requirements.

Major	Complete the course requirements for the Product Model Making Cert. of Achievement-Advanced	41 units
GE	General Education (31-42 units)	
Electives	Elective courses req'd. when major units plus GE units total is less than 90	
	Total Units Required	90 units