De Anza College

Academic Year
2014 - 2015

Manufacturing and
Computer Numerical Control (CNC)

21250 Stevens Creek Blvd.
Cupertino, CA 95014
408-864-5678
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MCNC Coordinator	Division Office	Counseling Center	Career Services Info.
Bldg. E2 Rm. E26A	Kirsh Center Building	Student and Community	Student and Community
408-864-8283	Room KC 228	Services Bldg. 2nd Fl.	Services Bldg. 2nd Fl.
	408-864-8773	408-864-5400	408-864-5400

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.

CNC Machinist
Certificate of Achievement
(Pending state approval. Check with the department for the status.)

The Computer Numerical Control (CNC) Machinist 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.

MCNC 60	Print Reading and Dimensional Metrology	4.5
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	18

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 the following:

MCNC 60	Print Reading and Dimensional Metrology	4.5
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 76D - 76E series (introductory) (4.5)		
CAD/CAM Based CNC Programming Using Mastercam		

Complete one (1) course from:		4.5
MCNC 76H - 76J series (4.5)		
CAD/CAM Based CNC Surface Contouring Programming Using Mastercam		

Complete one (1) course from:		4.5
MCNC 76N - 76Q series (4.5)		
CAD/CAM Based CNC 4 and 5 Axis Mill/Lathe Programming Using Mastercam		

Complete one (1) course from:		4.5
MCNC 78A - 78E series (4.5)		
CAM Based CNC Multi-Axis Programming Using NX		

Complete two (2) units from:		2
MCNC 80A	Special Projects in Manufacturing and CNC/Mastercam Level 1 (2)	
MCNC 80B	Special Projects in Manufacturing and CNC/Mastercam Level 2 (2)	
MCNC 80C	Special Projects in Manufacturing and CNC/Mastercam Level 3 (2)	
	Total Units Required	49.5

A.S. Degree

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

Major	*Complete the course requirements for the CNC Machinist Certificate of Achievement-Advanced*	*49.5 units*
GE	*General Education (31-42 units)*	
Electives	*Elective courses required when major units plus GE units total is less than 90*	
	Total Units Required	90 units

CNC Programming - CAD/CAM
Certificate of Achievement
(Pending state approval. Check with the department for the status.)

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

Complete one (1) course from:		4.5
MCNC 76H - 76J series (4.5)		
CAD/CAM Based CNC Surface Contouring Programming Using Mastercam		

Complete one (1) course from:		4.5
MCNC 76N - 76Q series (4.5)		
CAD/CAM Based CNC 4 and 5 Axis Mill/Lathe Programming Using Mastercam		

Complete one (1) course from:		4.5
MCNC 78A - 78E series (4.5)		
CAM Based CNC Multi-Axis Programming Using NX		
	Total Units Required	18

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 60	Print Reading and Dimensional Metrology	4.5
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

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

Complete one (1) course from: 4.5
MCNC 76H - 76J series (4.5)
CAD/CAM Based CNC Surface Contouring Programming
Using Mastercam

Complete one (1) course from: 4.5
MCNC 76N - 76Q series (4.5)
CAD/CAM Based CNC 4 and 5 Axis Mill/Lathe
Programming Using Mastercam

Complete four (4) units from: 4

MCNC 80D	Special Projects in Manufacturing and CNC/NIMS Level 1 (2)	
MCNC 80E	Special Projects in Manufacturing and CNC/NIMS Level 2 (2)	
MCNC 80F	Special Projects in Manufacturing and CNC/NIMS Level 3 (2)	
	Total Units Required	51.5

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	51.5 units
GE	General Education (31-42 units)	
Electives	Elective courses required 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 60   SolidWorks (Beginning) (4)
CDI 70   Creo Parametric (Beginning) (4)

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

Complete one (1) course from: 4.5
MCNC 76H - 76J series (4.5)
CAD/CAM Based CNC Surface Contouring Programming
Using Mastercam

Complete one (1) course from: 4.5
MCNC 76N - 76Q series (4.5)
CAD/CAM Based CNC 4 and 5 Axis Mill/Lathe
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 required when major units plus GE units total is less than 90	
	Total Units Required	90 units