MACH 80B Course Outline as of Fall 2020

CATALOG INFORMATION

Dept and Nbr: MACH 80B   Title: CNC MACHINE II
Full Title: Computer Numeric Control Machining II
Last Reviewed: 2/28/2022

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	5.00	Lecture Scheduled	4.00	17.5	Lecture Scheduled	70.00
Minimum	5.00	Lab Scheduled	4.00	6	Lab Scheduled	70.00
		Contact DHR	0		Contact DHR	0
		Contact Total	8.00		Contact Total	140.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 140.00   Total Student Learning Hours: 280.00

Title 5 Category: AA Degree Applicable
Grading: Grade Only
Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:
Formerly:

Catalog Description:
Intermediate operation and programming of Computer Numerical Control (CNC) machine tools.
Integration of Computer-Aided Drafting (CAD), design, and programming for Computer Aided
Machining (CAM) of machine parts on the CNC Machines. Applicable to entry and mid level
computer numerical control machine operators.

Prerequisites/Corequisites:
Course Completion of MACH 80A

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Intermediate operation and programming of Computer Numerical Control (CNC)
machine tools. Integration of Computer-Aided Drafting (CAD), design, and programming for
Computer Aided Machining (CAM) of machine parts on the CNC Machines. Applicable to entry
and mid level computer numerical control machine operators. (Grade Only)
Prerequisites/Corequisites: Course Completion of MACH 80A

Recommended:
Limits on Enrollment:
Transfer Credit: CSU;
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
CSU GE:	**Transfer Area**		Effective:	Inactive:
IGETC:	**Transfer Area**		Effective:	Inactive:
CSU Transfer:	Transferable	Effective:	Spring 1995	Inactive:
UC Transfer:		Effective:		Inactive:

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Select appropriate end mills for machining to CAD specifications
2. Describe the function of a post processor
3. Demonstrate proper set-up and operating procedures for CNC machines

Objectives:
Students will be able to:
1. Practice the safe use of tools and machines
2. Compare and contrast manual and CNC (computer numerical control) machining operations
3. Relate the theory of CNC mill operation to machining processes
4. Generate two-dimensional and 3-dimensional geometric images for CNC machining center projects using computer-aided drafting (CAD) software
5. Using a drafted image, write and interpret code for machining a part on a CNC machining center
6. Troubleshoot code for incorrectly machined parts
7. Calculate cutting speeds, feeds and tools for various computer numerical control machining center operations
8. Diagnose basic problems faced in the operation of the computer numeric control machining center

Topics and Scope:

I. Introduction
    A. Shop safety
    B. Print reading--working drawings
    C. Shop orientation--machine identification--facility layout
II. Basic Computer Numeric Control Operations

A. Manual vs. CNC operations
    1. Use
    2. Capabilities
    3. Theoretical and operational characteristics
B. CNC accessories
C. Cutting tools
    1. Characteristics
    2. Design
    3. Machining parameters
D. Production methods

III. Materials
    A. Types
    B. Properties

IV. CAD for CNC Machining Centers
    A. Design for manufacturing
    B. Generate a two-dimensional image
    C. Generate a 3-dimensional image
    D. Post processor

V. CNC Mill
    A. CNC theory
    B. Writing code (programming) for the CNC mill
        1. Translating a 2-dimensional image into code
        2. Translate a 3-dimensional image utilizing multiple work setups into code.
        3. Troubleshooting code
    C. CNC operation
        1. Set-up
        2. Operating procedures
    D. Production methods

VI. Other CNC Programs

All topics are covered in the lecture and lab portions of the course.

Assignment:

Lecture-Related Assignments:
1. Reading, 10-15 pages per week
2. Two to four quizzes; final exam

Lecture- and Lab-Related Assignments:
1. Complete CAD exercises and produce 2-dimensional drawings for CNC machining
2. Write code for machining a part from CAD drawings

Lab-Related Assignments:
1. Demonstrate proper set-up and operating procedure for CNC machines
2. Manufacture projects on the CNC mill from shop drawings

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.	Writing 0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

CAD exercises and produce 2-dimensional drawings for CNC machining	Problem solving 20 - 30%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Demonstrate proper set-up and operating procedures for CNC machines; Write code for machining a part from CAD drawings; Manufacture projects on the CNC mill from shop drawings	Skill Demonstrations 30 - 45%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes, final exam	Exams 30 - 40%

Other: Includes any assessment tools that do not logically fit into the above categories.

Professionalism	Other Category 5 - 10%

Representative Textbooks and Materials:
CNC Programming Handbook. 3rd ed. Smid, Peter. Industrial Press, Inc. 2007 (classic)