MACH 80A Course Outline as of Fall 2022

CATALOG INFORMATION

Dept and Nbr: MACH 80A Title: CNC MACHINE I Full Title: Computer Numeric Control Machining I 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	8	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:

This course introduces students to theoretical and operational characteristics of the Computer Numerical Control (CNC) machine tools. Students will be introduced to the integration of Computer-aided Drafting (CAD), design, and programming for Computer-aided Machining (CAM) of machine parts on the CNC machine tools. Applicable to entry-level computer numeric control machine tools operators.

Prerequisites/Corequisites:

Course Completion or Current Enrollment in MACH 51.1A (or MACH 51A)

Recommended Preparation:

Course Completion of CS 5

Limits on Enrollment:

Schedule of Classes Information:

Description: This course introduces students to theoretical and operational characteristics of the Computer Numerical Control (CNC) machine tools. Students will be introduced to the integration of Computer-aided Drafting (CAD), design, and programming for Computer-aided Machining (CAM) of machine parts on the CNC machine tools. Applicable to entry-level

computer numeric control machine tools operators. (Grade Only) Prerequisites/Corequisites: Course Completion or Current Enrollment in MACH 51.1A (or MACH 51A) Recommended: Course Completion of CS 5 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 CSU GE: Transfer Area				Effective: Effective:	Inactive: 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. Write a program using General Function (G) & Miscellaneous Function (M) code
- 2. Identify basic CNC machining tools

Objectives:

At the conclusion of this course, the student should be able to:

- 1. Practice the safe use of tools and machines
- 2. Compare and contrast manual and CNC machine operations
- 3. Explain the relationship between the theory of CNC machine operation and machining processes

4. Generate two-dimensional geometric images for CNC machining projects using CAD software

- 5. Using a drafted image, write and interpret G&M code for machining a part on a CNC machine
- 6. Troubleshoot code for incorrectly machined parts
- 7. Calculate cutting speeds and feed speeds for various CNC machining operations
- 8. Select appropriate cutting tools for machining to CAD specifications
- 9. Diagnose basic problems faced in the operation of the CNC machines

Topics and Scope:

- I. Introduction
 - A. Shop safety
 - B. Print reading and working drawings
 - C. Shop orientation and machine identification-facility layout

II. Basic CNC Operations

- A. Manual versus 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 machines
 - A. Design for manufacturing
 - B. Generating a two-dimensional image
- V. CNC Machining
 - A. CNC theory
 - B. Writing G&M code (programming) for the CNC machines
 - 1. Translating a 2-dimensional image into G&M code
 - 2. Troubleshooting code
 - C. CNC operation
- D. Production methods
- VI. Other CNC Programs

All topics covered in lecture and lab

Assignment:

Lecture-Related Assignments:

- 1. Weekly reading (10-15 pages)
- 2. Weekly quizzes
- 3. Midterm
- 4. Final exam

Lab-Related Assignments:

- 1. G&M code programs for machining a part from CAD drawings (5-10)
- 2. Performance evaluations of set-up and operating procedures for the CNC machines (5-10)
- 3. CAD exercises and production of 2-dimensional drawings for CNC machining (5-10)
- 4. Manufactured projects on the CNC machine from engineering drawings (5-10)
- 5. Organize workspace and clean-up lab area (professionalism)

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.

G&M code programs

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

G&M code programs

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

Performance exams, lab projects

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

Quizzes, midterm, final exam

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

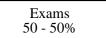
Professionalism

Representative Textbooks and Materials:

CNC Machining. Gizelbach, Richard. Goodheart-Willcox. 2009 (classic) CNC Programming Handbook. 3rd ed. Smid, Peter. Industrial Press, Inc. 2007 (classic) Instructor prepared materials

Problem solving 5 - 5%

Skill Demonstrations				
30 - 30%				



Other Category 10 - 10%