MACH 80B Course Outline as of Fall 2022

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	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:

Students will learn intermediate operation and programming of Computer Numerical Control (CNC) machine tools. Students will also engage in 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: Students will learn intermediate operation and programming of Computer Numerical Control (CNC) machine tools. Students will also engage in 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. Identify intermediate CNC machining tools.
- 2. Describe the differences between X, Y, and Z axis.
- 3. Identify and describe the main features of a basic Computer Aided Manufacturing CAM system.

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 Computer Numerical Control (CNC) 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
- C. Shop orientation
 - 1. Machine identification
 - 2. Facility layout
- II. Basic Computer Numeric Control 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 Machining Centers
 - A. Design for manufacturing
 - B. Generate a 2-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. Weekly reading (10-15 pages)
- 2. Quizzes (2-10)
- 3. Midterm
- 4. Final exam

Lecture- and Lab-Related Assignments:

- 1. CAD exercises and produce 2-dimensional and 3-dimensional drawings for CNC machining (2-5)
- 2. Produce CNC code for machining a part from CAD drawings (2-5)

Lab-Related Assignments:

1. Performance evaluations of proper set-up and operating procedure for CNC machines (2-5)

- 2. CNC manufacturing projects from engineering drawings (2-5)
- 3. 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.

Produce 2-5 CNC code for machining a part from CAD drawings

Writing 5 - 10%

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

CAD exercises and produce 2-dimensional and 3-dimensional drawings for CNC machining

Problem solving 5 - 10%

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

Performance evaluations of proper set-up and operating procedure for CNC machines; Produce CNC code for maching a part from CAD drawing; CNC manufacture projects from engineering drawings

Skill Demonstrations 25 - 30%

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

Ouizzes, midterm, final exam

Exams 40 - 50%

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

Professionalism

Other Category 10 - 10%

Representative Textbooks and Materials:

Instructor prepared materials