### MACH 80A Course Outline as of Fall 2017

# CATALOG INFORMATION

Dept and Nbr: MACH 80A      Title: INTRO CNC LATHE
Full Title: Introduction to Computer Numeric Control Lathe
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:**
Introduction to theoretical and operational characteristics of the CNC (computer numerical control) lathe. Integration of computer-aided drafting (CAD), design, and programming for Computer Aided Machining (CAM) of machine parts on the CNC lathe. Applicable to entry-level computer numeric control lathe operators.

**Prerequisites/Corequisites:**
Course Completion of MACH 51.1A ( or MACH 51A)

**Recommended Preparation:**
Course Completion of CS 101A

**Limits on Enrollment:**

**Schedule of Classes Information:**
Description: Introduction to theoretical and operational characteristics of the CNC (computer numerical control) lathe. Integration of computer-aided drafting (CAD), design, and programming for Computer Aided Machining (CAM) of machine parts on the CNC lathe. Applicable to entry-level computer numeric control lathe operators. (Grade Only)
Prerequisites/Corequisites: Course Completion of MACH 51.1A ( or MACH 51A)

Recommended: Course Completion of CS 101A
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. Write a program using G(General Function) & M (Miscellaneous Function) codes
2. Explain the difference between G&M codes
3. Describe types of turning tools used in CNC lathes

**Objectives:**
Upon successful completion of this course, the student will be able to:
1. Practice the safe use of tools and machines
2. Compare and contrast manual and CNC (computer numeric control) lathe operations
3. Relate the theory of CNC lathe operation to machining processes
4. Generate two-dimensional geometric images for CNC lathe projects using computer-aided drafting (CAD) software
5. Using a drafted image, write and interpret code for machining a part on a CNC lathe
6. Troubleshoot code for incorrectly machined parts
7. Calculate cutting speeds and feed speeds for various computer numeric control lathe operations
8. Select appropriate tool bits for machining to CAD specifications
9. Diagnose basic problems faced in the operation of the computer numeric control lathe

**Topics and Scope:**

I. Introduction
   A. Shop safety
   B. Print reading and working drawings
   C. Shop orientation and machine identification-facility layout
II. Basic Computer Numeric Control Lathe operations
   A. Manual vs. CNC (Computer Numeric Control) lathe operations

1. Use
    2. Capabilities
    3. Theoretical and operational characteristics
  B. Computer Numeric Control Accessories
  C. Cutting tools
    1. Characteristics
    2. Design
    3. Machining parameters
  D. Production methods
III. Materials
  A. Types
  B. Properties
IV. Computer-Aided Drafting (CAD) for CNC Lathe
  A. Design for manufacturing
  B. Generating a two-dimensional image
V. CNC Lathe
  A. Computer numeric control theory
  B. Writing code (programming) for the CNC lathe
    1. Translating a 2-dimensional image into code
    2. Troubleshooting code
  C. Computer Numeric Control operation
  D. Production methods
VI. Other Computer Numeric Control Programs

**Assignment:**

Representative assignments:
1. Demonstrate proper set-up and operating procedure for the computer numeric control lathe
2. Complete CAD exercises and produce 2-dimensional drawings for CNC machining
3. Write code for machining a part from CAD drawings
4. Manufacture projects on the computer numeric control lathe from shop drawings
5. Reading, 10-15 pages per week
6. Quizzes; final exam

**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<br>0 - 0% |

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

| | |
|---|---|
| Homework problems | Problem solving<br>20 - 30% |

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

| | |
|---|---|
| Performance exams, lab projects | Skill Demonstrations<br>30 - 45% |

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

| | |
|---|---|
| Multiple choice, true/false, matching items, completion | Exams<br>30 - 40% |

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

| | |
|---|---|
| None | Other Category<br>0 - 0% |

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