

**MACH 51A Course Outline as of Summer 2011****CATALOG INFORMATION**

Dept and Nbr: MACH 51A Title: BEG MACHINE TOOL TECH

Full Title: Beginning Machine Tool Technology

Last Reviewed: 2/28/2022

| Units   | Course Hours per Week |                   | Nbr of Weeks |      | Course Hours Total |       |
|---------|-----------------------|-------------------|--------------|------|--------------------|-------|
| Maximum | 2.00                  | Lecture Scheduled | 1.00         | 17.5 | Lecture Scheduled  | 17.50 |
| Minimum | 2.00                  | Lab Scheduled     | 3.00         | 8    | Lab Scheduled      | 52.50 |
|         |                       | Contact DHR       | 0            |      | Contact DHR        | 0     |
|         |                       | Contact Total     | 4.00         |      | Contact Total      | 70.00 |
|         |                       | Non-contact DHR   | 0            |      | Non-contact DHR    | 0     |

Total Out of Class Hours: 35.00

Total Student Learning Hours: 105.00

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 theory and practices of machining processes. Includes use and care of the lathe, mill, drill press, and common hand tools, and the measurement and layout of metal for producing a machine part to print specifications. Also recommended for students in related vocational areas.

**Prerequisites/Corequisites:****Recommended Preparation:**

Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:****Schedule of Classes Information:**

Description: Introduction to theory and practices of machining processes. Use and care of the lathe, mill, drill press and common hand tools; measurement and layout of metal for producing machine parts to print specifications. (Grade Only)

Prerequisites/Corequisites:

Recommended: Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                      |                      |                      |           |
|----------------------|----------------------|----------------------|-----------|
| <b>AS Degree:</b>    | <b>Area</b>          | Effective:           | Inactive: |
| <b>CSU GE:</b>       | <b>Transfer Area</b> | Effective:           | Inactive: |
| <b>IGETC:</b>        | <b>Transfer Area</b> | Effective:           | Inactive: |
| <b>CSU Transfer:</b> | Transferable         | Effective: Fall 1981 | Inactive: |
| <b>UC Transfer:</b>  |                      | Effective:           | Inactive: |

### **CID:**

#### **Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

Upon successful completion of this course the student will be able to:

1. Trace the development of the history and methods of machine tool Technology.
2. Identify and use common shop safety practices and equipment to prevent shop safety hazards.
3. Demonstrate knowledge of the theory of machining as applied to machine tool techniques.
4. Recognize and predict changes in the properties of metal when exposed to machine tool techniques.
5. Identify and describe applications of common mechanical hardware and hand tools found in the machine shop.
6. Read and interpret common detail drawings found in a machine shop.
7. Calculate and set appropriate angles for grinding a tool bit.
8. Describe set-up, operation, and safety procedures for the pedestal grinder.
9. Select the correct feeds and speeds for commonly used materials.
10. Describe the tools and methods of metrology/dimensional measurement.
11. Identify and describe the important components, controls, and functions of vertical and horizontal milling machines.
12. Compare and contrast three basic drill press types and explain their differences and primary uses.
13. Classify types of saws and describe their uses.
14. Calculate cutting speeds and feeds for a variety of machining processes.
15. Identify common methods of measurement conversions.
16. Identify the most important parts of the lathe, drill, and mill and describe the function of each relative to producing parts on manually operated machines.

17. Identify realistic career objectives in machine tool technology.

**Topics and Scope:**

I. History of Machine Tooling

- A. Development of technologies
- B. Development of power sources

II. Machine Tool Theory

- A. Common manufacturing materials and processes
- B. Properties of metals

III. Shop Safety

- A. Practices
- B. Equipment

IV. Grinding

- A. Tool bit grinding procedures and clearances
- B. Calculating and setting angles
- C. Pedestal grinder
  - 1. care
  - 2. safety
  - 3. set-up
  - 4. use

V. Lathes/Turning Machines

- A. Use
- B. Safety
- C. Set-ups
- D. Parts and functions
- E. Types of machines

VI. Blueprint Reading and Interpretation

VII. Metrology/Dimensional Measurement

- A. Types of measuring instruments
- B. Scales and rules
- C. Micrometer
- D. Height gage and vernier-scale

VIII. Milling Machines

- A. Vertical mills
- B. Horizontal mills
- C. Components, controls, and functions
- D. Care
- E. Safety
- F. Tooling operations
- G. Set-up
- H. Feeds
- I. Speeds
- J. RPM

IX. Drill Presses

- A. Types
- B. Care
- C. Safety
- D. Uses
- E. Drill speeds
- F. Feeds
- G. RPM

- H. Drill bits
  1. sharpening
  2. nomenclature

- X. Saws
  - A. Types
  - B Care
  - C. Safety
  - D. Set-up
  - E. Uses

- XI. Hand Tools
  - A. File types
  - B. Hammers
  - C. Hacksaws
  - D. Safety
  - E. Vises

- XII. Careers in Machine Tool Technology
  - A. Career options
  - B. Workplace ethics
  - C. Professionalism

**Assignment:**

1. Reading from assigned text, approximately 15 pages/week.
2. Weekly quizzes based on reading.
3. Lab projects related to creating hand and machine tool components. Projects will be graded for skill demonstration and problem solving and may include:
  - a. on a lathe, produce a hand tool by manufacturing parts & components;
  - b. set up a mill and mill a metal plate from a blueprint;
  - c. grind a tool bit, calculating and setting appropriate angles.
4. Compile a lab notebook of course notes and handouts.
5. Organize workspace and clean-up lab area.
6. Final written and performance exams.

**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.

Compile a lab notebook.

Writing  
10 - 20%

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

Lab projects.

Problem solving  
20 - 30%

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

Lab projects

Skill Demonstrations  
20 - 30%

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

Multiple choice, True/false, Matching items

Exams  
20 - 30%

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

Attendance, organization, and clean-up.

Other Category  
20 - 30%

**Representative Textbooks and Materials:**

Machine Tool Practices, Kibbe, R., Neely, D., and White, W. 9th edition, 2010.

Instructor prepared materials.