

**MACH 51.1A Course Outline as of Fall 2024****CATALOG INFORMATION**

Dept and Nbr: MACH 51.1A 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	3.00	Lecture Scheduled	2.25	17.5	Lecture Scheduled	39.38
Minimum	3.00	Lab Scheduled	2.25	8	Lab Scheduled	39.38
		Contact DHR	0		Contact DHR	0
		Contact Total	4.50		Contact Total	78.75
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 78.75

Total Student Learning Hours: 157.50

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: MACH 51A

**Catalog Description:**

In this course, students will learn the theory and practices of machining and advanced manufacturing processes, including the history and role of machining in today's society. Students will use and maintain the lathe, mill, drill press, and common hand tools. Students will learn precision measurement and layout of metal for producing a machined part to print specifications and determining speed and feed calculations, drill-press operations, lathe operations (turning and threading), and mill setup and operation.

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

Eligibility for ENGL 100 OR EMLS 100 (formerly ESL 100)

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

Description: In this course, students will learn the theory and practices of machining and advanced manufacturing processes, including the history and role of machining in today's society. Students will use and maintain the lathe, mill, drill press, and common hand tools.

Students will learn precision measurement and layout of metal for producing a machined part to print specifications and determining speed and feed calculations, drill-press operations, lathe operations (turning and threading), and mill setup and operation. (Grade Only)

Prerequisites/Corequisites:

Recommended: Eligibility for ENGL 100 OR EMLS 100 (formerly 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:
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<b>CSU Transfer:</b>	Transferable	Effective:	Fall 1981	Inactive:
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<b>UC Transfer:</b>		Effective:		Inactive:
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**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. Machine a thread to industry specifications
2. Determine high and low limits for a manufactured part
3. Perform a milling operation to blueprint specifications

**Objectives:**

At the conclusion of this course, the student should 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 and blueprints found in a machine shop.
7. Identify and set appropriate angles for cutting tools.
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
  - C. Professionalism
- IV. Grinding
  - A. Tool bit grinding procedures and clearances
  - B. Calculating and setting angles
  - C. Pedestal grinder (care, safety, set-up and 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. Revolutions per minute (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

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

**Assignment:**

Lecture-related Assignments

1. Weekly reading (15-20 pages)
2. Weekly quizzes based on reading
3. One midterm
4. Final exam

Lab-related Assignments:

1. Hand and machine tool projects (3-5).
2. Lab documentation (course notes, handouts, process plans and inspection sheets)
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.

Lab documentation
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Writing 10 - 20%
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**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Hand and machine tool projects

Problem solving  
20 - 30%

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

Hand and machine tool projects

Skill Demonstrations  
20 - 30%

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

Quizzes, midterm, final

Exams  
20 - 30%

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

Professionalism, participation, organization, and clean-up

Other Category  
10 - 20%

**Representative Textbooks and Materials:**

Precision Machining Technology. 3rd ed. Hoffman, Peter and Hopewell, Eric. Cengage. 2019  
Instructor prepared materials.