

MACH 51A Course Outline as of Fall 2019**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, 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. Includes use and care of the lathe, mill, drill press, 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. (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:

AS Degree:	Area	Effective:	Inactive:
CSU GE:	Transfer Area	Effective:	Inactive:
IGETC:	Transfer Area	Effective:	Inactive:
CSU Transfer:	Transferable	Effective: Fall 1981	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. Grind a tool bit utilizing a pedestal grinder and a piece of high speed steel (H.S.S)
2. Machine a threaded pin utilizing the tool bit that was previously made from H.S.S.
3. Mill a plate on a milling machine from a blueprint.

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
 - C. Professionalism
- 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

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

Assignment:

Lecture-related Assignments

1. Reading from assigned text, approximately 15 pages/week
2. Weekly quizzes based on reading (8 - 16)
3. Final written and performance exams

Lab-related Assignments:

1. 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
2. Compile a lab notebook of course notes, handouts, process plans and inspection sheets
3. Organize workspace and clean-up lab area

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.

Weekly quizzes based on reading

Exams
20 - 30%

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

Professionalism, attendance, organization, and clean-up

Other Category
20 - 30%

Representative Textbooks and Materials:

Precision Machining Technology. 2nd ed. Hoffman, Peter and Hopewell, Eric and Janes, Brian. 2015

Instructor prepared materials.